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CATALOGUE

OF THE

UNIVERSITY OF MICHIGAN

1920-1921

ANN ARBOR
PUBLISHED BY THE UNIVERSITY
1921

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Calendar

1920-1921 and 1921-1922 .

1920	
June 21-August 28.	Summer Session in the Law School.
June 28-August 20.	Summer Session in all Schools and Colleges except Medicine and Law.
June 28-August 6.	Summer Session in the Medical Schools.
September 27-Oct. 1.	Examination for Admission.
September 28.	Registration begins.
October 5.	FIRST SEMESTER BEGINS IN ALL SCHOOLS AND COLLEGES OF THE UNIVERSITY.
November 25.	Holiday, Thanksgiving Day.
December 21.	(Evening) Holiday Vacation begins.
1921	
January 5.	(Morning) Exercises resumed.
February 18.	(Evening) FIRST SEMESTER CLOSES.
February 17-19.	Examinations for Admission to all the Colleges.
February 21.	SECOND SEMESTER BEGINS.
February 22.	Holiday, Washington's Birthday.
April 8.	(Evening) Spring Recess begins.
April 19.	(Morning) Exercises resumed.
May 30.	Holiday, Memorial Day.
June 26.	BACCALAUREATE ADDRESS, to be delivered by President Marion LeRoy Burton, Ph.D., LL.D.
June 27-28.	Class Day Exercises in the several Schools and Colleges.
June 28-29.	Alumni Days.

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June 30.	COMMENCEMENT. The Commencement Oration is to be delivered by the Right Honorable Sir Auckland Campbell Geddes, K.C.B., M.D., LL.D., British Ambassador to the United States.
June 27-Sept. 3.	Summer Session in the Law School.
July 5-August 13.	Summer Session in the Medical Schools.
July 5-August 26.	Summer Session in all Schools and Colleges of the University except Medicine and Law.
September 26-30.	Examinations for Admission to all the Colleges of the University.
September 20.	Registration begins.
September 27.	FIRST SEMESTER BEGINS IN ALL SCHOOLS AND COLLEGES OF THE UNIVERSITY.
November 24.	Holiday, Thanksgiving Day.
December 16.	(Evening) Holiday Vacation begins.
1922	
January 3.	(Morning) Exercises resumed.
February 10.	(Evening) FIRST SEMESTER CLOSES.
February 9-11.	Examinations for Admission to all the Colleges.
February 13.	SECOND SEMESTER BEGINS.
February 22.	Holiday, Washington's Birthday.
April 7.	(Evening) Spring Recess begins.
April 18.	(Morning) Exercises resumed.
May 30.	Holiday, Memorial Day.
June 19.	COMMENCEMENT.
June 26.	Summer Session begins in all the Schools and Colleges (except Law).
September 18-22.	Examinations for Admission to all the Colleges.
September 26.	FIRST SEMESTER BEGINS IN ALL SCHOOLS AND COLLEGES.

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1921

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PRESIDENT

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HON. VICTOR M. GORE, *Benton Harbor*	Dec. 31, 1921
HON. JUNIUS E. BEAL, *Ann Arbor*	Dec. 31, 1923
HON. FRANK B. LELAND, *Detroit*	Dec. 31, 1923
HON. WILLIAM L. CLEMENTS, *Bay City*	Dec. 31, 1925
HON. JAMES O. MURFIN, *Detroit*	Dec. 31, 1925
HON. BENJAMIN S. HANCHETT, *Grand Rapids*	Dec. 31, 1927
HON. LUCIUS L. HUBBARD, *Houghton*	Dec. 31, 1927

HON. THOMAS E. JOHNSON, *Lansing*,
SUPERINTENDENT OF PUBLIC INSTRUCTION.

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SECRETARY OF THE BOARD.

ROBERT A. CAMPBELL,
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For 1920 and 1921

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REGENTS LELAND, SAWYER and HUBBARD.

Salaries
REGENTS GORE, MURFIN, and LELAND.

Buildings and Grounds
REGENTS CLEMENTS, HANCHETT, and HUBBARD.

Library
REGENTS CLEMENTS, HUBBARD, and GORE.

Educational Policies
PRESIDENT BURTON, REGENTS LELAND and GORE.

Promotion of Research
REGENTS HANCHETT, CLEMENTS, and SAWYER.

Student Welfare
REGENTS MURFIN, HANCHETT, and BEAL.

* The first named member of each committee is the chairman. The President is *ex officio* a member of all committees.

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NELVILLE SOULE HOFF, D.D.S., *Professor of Prosthetic Dentistry.*

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* The names of Professors (including Librarian), Associate Professors, Assistant Professors, and other officers of instruction are placed in their appropriate divisions, according to term of appointment and length of continuous service with present rank.

‡ Died September 29, 1920.

† The dagger preceding a name indicates that the member of the Faculty is absent on leave.

¶ Died April 12, 1921

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CLARENCE ASHLEY LIGHTNER, A.M., Detroit, *Lecturer on Medical Jurisprudence.*

WILLIAM HAMILTON SELLEW, S.B., Detroit, *Lecturer on Railway Engineering.*

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College of Pharmacy

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Homoeopathic Medical School

WILBERT B. HINSDALE, M.S., A.M., M.D., *Dean.*

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Summer Session, 1920

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BYRON ALFRED FINNEY, A.B., *Reference Librarian Emeritus.*

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CLARE MULLETT, *In Charge of Graduate Reading Room.*

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LALAH ELSA HUEHL, *Stenographer.*

ELANA KNOTT TAYLOR, A.M., *Assistant in Study Hall.*

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MAUDE BLODGETT, *Cataloguer.*

NAOMI MARY BEHN, *Assistant, Cataloguing Department.*

DOROTHY LILLIAN IDE, *Assistant, Cataloguing Department.*

H. REBECCA WILSON, B.Pd., *Cataloguer.*

RANDALL W. B. FRENCH, *Assistant at Corridor Desk.*

WILLIAM F. LOWE, *Assistant in Periodical Room.*

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FLORENCE BELLE HAMMOND, A.B., *Assistant in Order Department.*

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ESTELLE GERTRUDE MACKENSEN, *Stenographer.*

ERNST GEORGE SIEFERT, A.B., *Assistant in Graduate Reading Room.*

BARBARA SNURE, A.B., *Cataloguer.*

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MARGARET EUGENIA VINTON, *Assistant Classifier.*

MABEL A. WATTS, *Assistant Cataloguer.*

LEWIS RONALD WILLIAMS, *Assistant at Corridor Desk.*

ELIZABETH WIDNEY, *Assistant Cataloguer.*

ALVINA WOODFORD, *Assistant Photostat Operator.*

Law Library

VICTOR H. LANE, C.E., LL.B., *Librarian.*

†ELIZABETH BEAL STEERE, A.B., *Assistant Librarian.*

BLANCHE E. HARROUN, *Assistant Librarian.*

HELEN BELFIELD BATES, A.B., *Assistant Librarian.*

VOLNEY A. CHAPIN, *Assistant.*

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WILLIAM LINCOLN MIGGETT, M.E., *Superintendent of the Engineering Shops.*

JOHN AIREY, B.S., *Acting Superintendent of the Engineering Shops.*

ALEXANDER GRANT RUTHVEN, Ph.D., *Director of the Museum of Zoölogy.*

HARLEY HARRIS BARTLETT, A.B., *Director of the Botanical Garden.*

LEROY NELSON PATTISON, B.D., A.M., *Assistant Curator of the Alumni Memorial Hall.*

GILBERT HENRY HARRISON, *Assistant Superintendent of the Engineering Shops.*

FREDERICK McMAHON GAIGE, B.S., *Instructor and Curator in the Museum of Zoölogy.*

LEE RAYMOND DICE, Ph.D., *Instructor and Curator in the Museum of Zoölogy.*

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CARL L. HUBBS, A.M., *Instructor and Curator in the Museum of Zoölogy.*

FRIEDA COBB, Ph.D., *Assistant Director of the Bonatic Gardens.*

HELEN THOMPSON GAIGE, A.M., *Administrative Assistant in the Museum of Zoölogy.*

MINA LOUISE WINSLOW, A.M., *Scientific Assistant in the Museum of Zoölogy.*

THEODORE H. HUBBELL, A.B., *Assistant in the Museum of Zoölogy.*

MILDRED DOREEN POTTER, A.B., *Assistant in the Museum of Zoölogy.*

HARLEY B. SHERMAN, B.S., *Assistant in the Museum of Zoölogy.*

ROBERTA DEAM, A.B., *Assistant in the Museum of Botany.*

HENRY JULIUS COLLIAU, *Instrument Maker at the Observatory.*

FRANK L. PUTNAM, *Assistant Instrument Maker at the Observatory.*

BURR F. ANDERSON, *Technical Assistant in Roentgenology.*

MARTIN BILON, *Head Gardener, Botanic Garden.*

JOHN BONIN, *Instrument Room Assistant in Surveying.*

DANIEL J. BORDEN, *Laboratory Attendant in Physiology and Pharmacology.*

EDWIN A. BOYD, *Laboratory Attendant in Highway Engineering.*

HARRY D. BOYD, *Instrument Room Assistant in Mechanical Engineering.*

SARAH CLARKSON, A.B., *Technical Assistant in Internal Medicine.*

WILLIAM L. CRISTANELLI, *Technician in Zoölogy.*

OSWALD M. GRUHZIT, M.S., *Technical Assistant in Pathology.*

ERNEST E. HUBER, *Technical Assistant in Anatomy.*

MORIKIYO UYEHARA, *Technical Assistant in Zoölogy.*

IDA L. WIEBER, *Technical Assistant in Pathology.*

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BRYANT WALKER, A.B., LL.B., Detroit, *Honorary Curator of Mollusca.*

WILLIAM W. NEWCOMB, B.S., M.D., Detroit, *Honorary Curator of Lepidoptera.*

ARTHUR S. PEARSE, Ph.D., Madison, Wis., *Honorary Curator of Crustacea.*

BRADSHAW HALL SWALES, LL.M., Grosse Isle, *Honorary Associate in the Museum.*

ARTHUR W. ANDREWS, Detroit, *Honorary Associate in the Museum.*

CHARLES KEENE DODGE, A.B., Port Huron, *Honorary Associate in the Museum.*

Hospitals

CHRISTOPHER G. PARNALL, A.B., M.D., *Director of the University Hospital.*

DURAND WILLIAM SPRINGER, B.S., *Superintendent of the University Homoeopathic Hospital.*

ROBERT GEORGE GREVE, *Steward of the University Hospital.*

†GENEVIEVE REED, *Principal of the Training School for Nurses in the University Homoeopathic Hospital.*

MARY A. WALSH, *Principal of the Training School for Nurses in the University Hospital.*

BARBARA HAECKER BARTLETT, B.S., *Director of Courses in Public Health Nursing.*

EDNA M. CRANDELL, R.N., *Acting Principal of the Training School for Nurses in the University Homoeopathic Hospital.*

JAMES PERRY BRIGGS, Ph.C., *Pharmacist in the University Hospital.*

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PHILIP GEORGE BARTELME, *Director of Outdoor Athletics.*

MARION OLIVE WOOD, *Director of the Barbour Gymnasium.*

STEPHEN JOHN FARRELL, *Instructor in Physical Training.*

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MARION DAWLEY, *Instructor in Physical Education.*

ROY C. BUELL, *Instructor in Physical Training.*

IRVING B. CLARK, *Instructor in Physical Training.*

MARJORIE BROWN, *Teaching Assistant in Physical Education.*

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ROBERT ARTHUR, Major, U. S. A., *Professor of Military Science and Tactics, and Commandant.*

WILLIS SHIPPAM, M.E., Major, U. S. A., *Assistant Professor of Military Science and Tactics, and Adjutant.*

HARRY F. MILLER, Private, U.S.A., *Assistant in Military Science.*

University Health Service

WARREN ELLSWORTH FORSYTHE, B.S., M.D., *Director and Physician to the University Health Service.*

M. ELOISE WALKER, A.B., M.D., *Associate Physician to the University Health Service.*

VIRGIL A. ROSS, M.D., *Assistant Physician to the University Health Service.*

CHARLES C. WOLCOTT, B.S., M.D., *Assistant Physician to the University Health Service.*

WILLIAM P. EDMUNDS, M.D., *Assistant Physician to the University Health Service.*

EMERY W. SINK, M.S., M.D., *Refractionist.*

LEONARD RANSOM WAGNER, Ph.C., *Pharmacist to the University Health Service.*

RHODA HAND, *Clerk to the University Health Service.*

Board in Control of Athletics

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University of Michigan

THE UNIVERSITY AND THE STATE

The University of Michigan is a part of the public educational system of the State. The governing body of the institution is a Board of Regents, elected by popular vote for terms of eight years, as provided in the Constitution of the State. In accordance with the laws of the State, the University aims to complete and crown the work that is begun in the public schools by furnishing ample facilities for liberal education in literature, science, and arts, and for thorough professional study of engineering, architecture, medicine, law, pharmacy, and dentistry. Through the aid that has been received from the United States and from the State, it is enabled to offer its privileges, with only moderate charges, to all persons of either sex, who are qualified for admission. While Michigan has endowed her University primarily for the higher education of her own sons and daughters, it must be understood that she also opens the doors of the institution to all students wherever their homes. It is in this broad, generous, and hospitable spirit that the University has been founded, and that it endeavors to do its work.

I. The College of Literature, Science, and the Arts.
II. The Colleges of Engineering and Architecture.
III. The Medical School.
IV. The Law School.
V. The College of Pharmacy.
VI. The Homœopathic Medical School.
VII. The College of Dental Surgery.
VIII. The Graduate School.

In a Summer Session regular courses of instruction are given in the College of Literature, Science, and the Arts, the Colleges of Engineering and Architecture, the Medical School, the Law School, the College of Pharmacy, the Homœopathic Medical School, and the Graduate School, together with a School of Library Methods and a Biological Station.

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On the completion of prescribed courses of study degrees are conferred by the University as follows: In the College of Literature, Science, and the Arts, the degrees of Bachelor of Arts, and Bachelor of Science; in the Colleges of Engineering and Architecture, the degrees of Bachelor of Engineering and Bachelor of Architecture; in the Medical School, the degree of Doctor of Medicine; in the Law School, the degrees of Bachelor of Laws, Juris Doctor, and Master of Laws; in the College of Pharmacy, the degrees of Pharmaceutical Chemist and Bachelor of Science (in Pharmacy); in the Homœopathic Medical School, the degree of Doctor of Medicine; in the College of Dental Surgery, the degree of Doctor of Dental Surgery; in the Graduate School, the degrees of Master of Arts, Master of Science, Master of Landscape Design, Master of Science in Engineering and in Architecture, Master of Science (in Pharmacy), Master of Science in Public Health, Civil Engineer, Mechanical Engineer, Electrical Engineer, Chemical Engineer, Marine Engineer and Naval Architect, Doctor of Philosophy, Doctor of Science, and Doctor of Public Health.

Students in any School or College of the University may enter the classes in any other School or College, upon obtaining permission from the two faculties.

THE UNIVERSITY SENATE

The University Senate is a body composed of the President of the University, the Professors, Associate Professors, and Assistant Professors of all the Schools and Colleges, and the Librarian. The University Senate is authorized to consider any subject pertaining to the interests of the University, and to make recommendations to the Regents in regard thereto.

The Senate Council consists of the President of the University, the Deans of the several Schools and Colleges, the Chairman of the Committee on Student Affairs, and members elected by the several faculties as follows: from the College of Literature, Science, and the Arts, two; and from the Colleges of Engineering and Architecture, the Medical School, the Law School, the College of Pharmacy, the Homœopathic Medical School and the College of Dental Surgery, one each.

The functions of the Senate Council are as follows:

1. To consider matters appertaining to the general welfare of the University and report upon the same to the University Senate.

2. To communicate to the Regents through the President the action of the Senate.

3. To act for the Senate during vacation periods.

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4. To adopt rules and regulations for the transaction of its business and to elect a secretary from its members, who is empowered to call meetings at the direction of the President, at the request of two Deans, or three members of the Council, or upon the written request of five members of the University Senate.

5. To call upon members of the University Senate for such service, information, and assistance as may be desirable.

THE LIBRARIES

The Libraries of the University are the General Library, the Engineering Library, the Medical Library, the Law Library, the Homœopathic Library, the Dental Library, the Natural Science Library, and the Chemical Library. They contained in the aggregate, June 30, 1920, 432,394 volumes. Two thousand fifty-three periodicals are regularly received.

THE GENERAL LIBRARY contains 333,291 volumes and over 5,000 maps. It includes the following special collections: Parsons Library (political economy), 6,076 volumes; McMillan Shakespeare Library, 6,525 volumes; Goethe Library, 1,131 volumes. The Hagerman Collection and the Dorsch Library, formerly treated as special collections, have, with the approval of the donors, been merged in the general collection.

Within the last few years the library has been enriched by several large and valuable gifts. Among the more important of these that deserve special mention are the historical books, including the Stevens Facsimiles, presented by Mr. Clarence M. Burton, of Detroit; the Morris Philosophical Library, presented by Mrs. George S. Morris; the Alpheus Felch Historical Library, bequeathed by the late Governor Alpheus Felch; the Walter Library of Romance Literature, bequeathed by the late Professor Edward L. Walter; the Stearns Musical collection, presented by Messrs. Frederick and Frederick K. Stearns, of Detroit; the Germanic Library of the late Professor George A. Hench, presented by his mother, Mrs. Rebecca A. Hench; the Geological Library of the late Professor Israel C. Russell, presented by his widow; the E. Cora DePuy collection of original manuscripts of authors; and the major portion of the libraries of Richard Hudson, former Professor of History, of Elisha Jones, formerly Professor of Greek, and of the late Mr. T. S. Jerome, of Capri, Italy.

In February, 1920, the Hon. William L. Clements, B.S., 1882, Regent of the University, announced his prospective gift to the University of his valuable library of books and original manuscripts, especially rich in colonial history, together with a suitable building to house the collection. By this addition the University of Michigan will

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acquire an equipment unsurpassed for the study of American history. The building will be erected and the library transferred in the near future.

The University library is one of the depositories for the printed catalogue cards issued by the Library of Congress; it has acquired those printed by the John Crerar Library, of Chicago; it subscribes, also, to the card publications of the American Library Association, Harvard University, the University of Chicago, the Royal Library, Berlin, and various other libraries. The bulk of the University's book possessions are now recorded in a public catalogue based largely on these various series of printed cards.

A large new library building was opened in January, 1920. This building has seats in its various reading rooms for about one thousand readers, and can house over a million volumes. Special facilities are afforded for advanced students in the immediate vicinity of the books, and ample provision is made for the quick service of books required to be read by undergraduates. There are also special reading rooms for current periodicals and for medical periodicals and books. The Bindery and Printing Plant are in the basement.

Books may be drawn by all officers and students of the University, and by others having special permission. The library is open for consultation fourteen hours daily, except during the vacation after the close of the summer session, when it is open ten hours daily. During the regular academic year the library is open on Sundays, for reference use, from 2 to 9 P. M. On important legal holidays the library is closed.

The income of the FORD-MESSER BEQUEST of $20,000, of the COYL BEQUEST of $10,000, and of the OCTAVIA WILLIAMS BATES BEQUEST of over $17,000, is used for the increase of the General Library.

THE NATURAL SCIENCE LIBRARY, containing 15,461 volumes, is housed in a specially designed room in the Natural Science building. It is in charge of an assistant detailed from the General Library. It covers the modern books and periodicals in Psychology, Mineralogy, Zoölogy, Botany, and Forestry. One hundred eighty-five periodicals are received.

THE CHEMICAL LIBRARY, containing 9,882 volumes, occupies a special room in the Chemistry and Pharmacy building and is in charge of an assistant detailed from the General Library. One hundred nineteen periodicals are currently received.

THE ENGINEERING LIBRARY, containing 15,703 volumes, occupies a special room in the Engineering building and is in charge of an assistant detailed from the General Library. The Architectural Library, containing 2,279 volumes, is housed in the Engineering Library. In addition, more than four thousand books on Engineering and Architecture are shelved with the collections of the General Library. One hundred ninety-eight engineering and architectural periodicals are received.

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THE MEDICAL LIBRARY, containing 31,299 volumes and 500 pamphlets, is shelved with the General Library, and is consulted under its regulations. Four hundred forty-one periodicals are regularly received.

THE LAW LIBRARY, containing 41,882 volumes, occupies the large room on the second floor of the Law building. Fifty-five periodicals are taken.

THE LIBRARY OF THE HOMOEOPATHIC MEDICAL SCHOOL is shelved with the General Library, and is subject to its regulations. It contains 4,414 volumes. Twenty-nine periodicals are regularly received.

THE LIBRARY OF THE COLLEGE OF DENTAL SURGERY* is shelved in a room in the Dental building. It contains numerous sets of valuable periodicals and the most important treatises on the theory and practice of dentistry. The whole number of volumes is 3,526. The library has recently been enriched by the private collection of the late Dr. W. D. Miller, consisting of about three hundred volumes. Twenty-five dental periodicals are taken.

THE ASTRONOMICAL OBSERVATORY

The University Observatory was founded in 1852, through the liberality of citizens of Detroit, and on this account it was named Detroit Observatory. It is situated on the northeastern border of the city of Ann Arbor, about half a mile from the University, on a site overlooking the valley of the Huron River. The Observatory grounds now contain thirty acres.

In the beginning the principal instruments of the Observatory were a refracting telescope of 12¼ inches aperture, constructed by Henry Fitz, of New York; a meridian circle of six inches aperture by Pister & Martins, of Berlin, the gift of Henry N. Walker, of Detroit; a sidereal clock by Tiede; a chronograph by Bond; and a four-inch comet-seeker.

About 1880, to increase the facilities for instruction, a six-inch refracting telescope, equatorially mounted, with objective by Alvan Clark & Sons, and a three-inch transit instrument, with zenith telescope attachment, were obtained, both made by Fauth & Company, of Washington. Since then to the same end other instruments have been obtained, notably the following: a mean time clock by Howard, chronometers by Bond, and by Negus, chronograph by Saegmuller, altazimuth instrument by Wurdemann, theodolites by Brandis, sextants, transit, computing machines, etc. The 12¼-inch refractor was reconstructed by the Observatory Shop in 1907 and a new filar micrometer fitted to it, made by the Warner & Swasey Company, of

* Named the Taft Library in honor of the late Professor Jonathan Taft, by action of the Board of Regents in July, 1904.

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Cleveland. A new driving clock has been made for the six-inch refractor and a camera has been attached to this instrument for making astronomical photographs. This camera has a Tessar lens of 4.5 inches aperture. A new comet seeker of 4.5 inches aperture has also been constructed.

Facilities for modern astrophysical research have been provided by installing a large reflecting telescope, of 37½ inches aperture. This instrument was designed at the Observatory and built by the Observatory Shop. The optical parts were made by the John A. Brashear Company, of Allegheny. It is equatorially mounted and is used as a Cassegrain reflector. Since its completion, in 1911, it has been used by officers of the Observatory and by graduate students almost exclusively for stellar spectrographic research. It is supplied with a single-prism spectrograph of efficient modern construction, designed especially for radical velocity determinations. The Observatory has four engines designed particularly for the measurement of spectrograms; also a large comparator, which may be used for this purpose, and likewise for the measurement of rectangular coordinates of stellar photographs; and a Hartmann microphotometer by Telfer, having attachments enabling it to be used as a measuring engine.

A refracting telescope of twenty-four inches aperture, the gift of Mr. R. P. Lamont, of Chicago, has been designed at the Observatory. This instrument is in an advanced stage of construction. Its completion has been delayed owing to the difficulty in obtaining the disks of glass required for the objective.

The Observatory has received, as a gift from Justice J. E. Howell, of Newark, New Jersey, a portable telescope of 4.6 inches aperture, made by Benj. Pike's Sons, of New York.

A set of seismographs for the registration of vibrations due to earthquakes has been continuously in operation since 1909. This set includes two Bosch-Omori horizontal pendulums, each with a steady mass of 220 pounds; a Weichert seismograph, also with a steady mass of 220 pounds, and registering two horizontal components; and a Weichert vertical seismograph.

A shop supplied with excellent machine and hand tools is maintained at the Observatory. It has been an important factor in developing the resources of the Observatory, by the construction of new instruments and the modification of old ones, to meet the requirements of instruction and research.

The larger instruments are intended for research, and when not otherwise employed will be available to that end to such students as have the technical ability to use them to advantage.

For many years the Observatory has been receiving the principal astronomical publications, and its technical library is reasonably complete. It contains nearly all the printed star catalogues, most of the modern publications of observatories and astronomical societies, and nearly complete files of the astronomical periodicals.

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THE MUSEUMS

The University Museums contain collections in zoology, anthropology, geology, mineralogy, botany, materia medica, chemistry, anatomy, the industrial arts, and the fine arts. These are deposited in the various buildings devoted to the subjects they illustrate, except the zoological and anthropological collections, which are housed in a separate building—the Museum of Zoology. All of these are accessible both to students and to visitors. The University affords a secure depository for objects of value, and it is hoped that frequent gifts will be made to its several collections.

THE MUSEUM OF ZOOLOGY

The collection in the Museum of Zoology may be ascribed as follows:

I. THE ZOOLOGICAL COLLECTIONS.—These are large and valuable. They include a series of animals from Western United States made by Lieutenant Trowbridge, a large number of specimens from South America and the Philippines collected by Dr. Joseph B. Steere, a considerable amount of material obtained by the Museum expeditions to various parts of the United States, South America, and Central America, and the extensive collections of the Michigan Geological and Biological Survey. A special effort is made to accumulate zoological specimens from all parts of the State in sufficient quantity to permit of detailed scientific study, and to obtain the foreign forms needed in comparative work. All of the collections are available for study, the specimens being catalogued and systematically arranged, and the mammals, birds, reptiles, amphibians, and insects have also been systematically catalogued. As far as circumstances will permit, capable persons are given every opportunity to study the collections.

The Mammal Collection contains a valuable series of skins and osteological preparations in addition to the specimens on exhibition. There are about 1,000 specimens in this department, most of which are from Michigan, but foreign types are being acquired as rapidly as possible.

The Bird Collection includes about 8,000 skins and 1,600 mounted specimens. There are large series from Michigan, representing the variations with age and sex in many species, but there are also many specimens from various parts of the new and old worlds. The collection of bird stomachs numbers 2,500 entries. A series of groups illustrating biological facts has been installed. In these groups the natural surroundings are reproduced in detail. There are forty-three types, eight paratypes, and two cotypes, representing forty-four species in the collection.

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The Reptile and Amphibian Collection contains a large series of Michigan specimens, the variety and number of specimens making it the most valuable collection of its kind in the State. In addition to the Michigan material there are several thousand specimens from various parts of North, Middle, and South America and a rapidly growing series of Old World forms. There are many types in the collection.

The Fish Collection is composed almost entirely of Michigan forms. There are about 12,000 specimens, most of which were collected by the various surveys and which are thus accompanied by ecological data.

The Mollusk Collection includes shells of about 6,000 species, representing most of the genera of the land, fresh-water, and marine shells. The specimens have for the most part been identified by experts which makes the collection of special value to the student.

The Insect Collection at present contains several thousand determined species, representing about 150 families, which are systematically arranged and catalogued. The collection is particularly strong in Michigan material, and much of this has been collected by the several Museum and State surveys and is accompanied by ecological data. The material is from nearly every state in the Union, and Europe, Africa, South and Middle America, and the South Pacific Islands. There is a particularly good series, principally economic forms, from the Philippines (the Ledyard Collection). There are many types in the collection.

Miscellaneous Invertebrates. — The collections of invertebrates other than insects and mollusks consist largely of miscellaneous material for illustrative purposes. The only extensive series is of Crustacea, which comprises a determined collection of American forms. There are types and paratypes of several special of crustaceans.

II. THE ANTHROPOLOGICAL COLLECTIONS. — Among the most notable features of this department of the Museum are:—

a. *The Oriental Section,* including the entire Chinese Collection, mentioned below, weapons, clothing, farm implements, carpenters' tools, porcelains, and idols, from China, Formosa, and the Philippines, secured by the Beal-Steere Expedition, and an interesting series of South Sea Island weapons, presented by the Smithsonian Institution.

In 1885 the Chinese government presented to the University the exhibit which it sent to the New Orleans Exposition. A part of the collection, numbering several thousand specimens, is on exhibition in the museum building. It illustrates with special fullness the varieties of Chinese cotton, the Chinese processes of manufacturing cotton and the finished products of cotton and silk. There are many articles showing the skill of the Chinese in working wood, ivory, and porcelain, in embroidery, and in painting on glass and on silk.

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b. *The Collection of Peruvian and New Mexican Ceramics,* including an exceptionally fine series of ancient Peruvian burial pottery and modern basins secured by the Beal-Steere Expedition, and an extensive series of New Mexican pottery received from the Smithsonian Institution.

c. *The Modern Indian Section,* including wearing apparel, implements of war and the chase, and household utensils, of the South American, North American, and the Alaskan Indians, and a fine example of the Alaskan totemic column.

d. *The Stone Age Section,* including the local collection of the late David De Pue, a series of Danish implements, and a series of casts of rare implements prepared by the Smithsonian Institution.

SPECIAL COLLECTIONS AND MUSEUMS

MINERALOGICAL AND PETROGRAPHICAL COLLECTIONS.—The exhibition collections of the department of Mineralogy and Petrography are displayed in Room M 222 of the Natural Science Building, which is open to the public daily, from 8 A. M. to 5 P. M., whenever the University is in session. The large systematic mineral collection is exhibited in five central cases, beginning at the east end of the room. The sixth central case contains an excellent collection of gems and gem minerals. The wall cases in the northeast corner contain collections illustrating the common physical properties of minerals. American rocks, important marbles and granites suitable for building and decorative purposes, and a collection of Michigan rocks and minerals are to be found in the smaller wall cases on the south side of the room. The deep wall cases contain large and unusual specimens. In the cases between the windows have been placed collections of crystals and glass crystal models. Instructive photographs illustrating diamond mining in South Africa are also shown in this room.

GEOLOGICAL AND PALEONTOLOGICAL COLLECTIONS.—The Paleontological collections are, in large part, in the Geological Museum in the Natural Science building. The invertebrate collections consist of several thousand carefully identified specimens illustrating the extinct forms of life. The specimens are arranged to illustrate the zoological and botanical characters of extinct life forms, the stratigraphical sequence of fossils, the relation between living and extinct forms, and certain definite lines of evolution. Models of extinct forms accompany the fossils to show the appearance of the animals in life. The paleontology laboratory contains numerous collections from different localities, affording opportunity for the student to become acquainted with the fossils of definite geological horizons. Among the more important units in the collections are the collections of the Michigan Geological Survey, the Rominger collection of corals, the White collection, and the Springer collection of crinoids.

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The vertebrate fossils are in part located with the invertebrates in the Geological Museum, but some of the larger mounted specimens are placed in the Museum building. These specimens, with appropriate models and photographs, serve to illustrate the development of vertebrate life.

The Geological collections illustrating the structure and character of rocks will be installed in cases in the corridor of the second floor of the Natural Science building.

The collections of PHARMACOGNOSY and INDUSTRIAL CHEMISTRY occupy a floor space of 2,500 square feet in the Chemistry and Pharmacy building, and are briefly described as follows:

THE PHARMACOGNOSY COLLECTION comprises several thousand mounted and labeled specimens of products from all parts of the world, such as are used for medicinal, food, and industrial purposes. The articles are of vegetable and of animal origin and are arranged in the present system of scientific classification. Water-color plates and photographs, showing the form and habit of the plant, accompany the exhibits. Series of chemical constituents, isolated by students, and mounted in part in the relative proportions in which they exist in the plant, make up a phytochemical exhibit. There is a set of drawings, photo-micrographs, and wall-charts of the historical structure of drugs, foods, and condiments, for aid in the study of adulteration.

The cultivation and preparation for the market and the commerce of these articles among the peoples of the earth are illustrated by collections of authentic photographs, many of which have been expressly procured for the study of commerce with distant parts of the world.

CHEMICAL INDUSTRY.—This collection contains exhibits illustrating the raw materials, intermediate products, and final products of those manufacturing industries whose operations are chemical in nature. Among the industries represented are those which produce salts of various types, acids, alkalies and bleaching powder; pottery, glass, and Portland cement; electric furnace products; copper, steel, and other metals and alloys; the by-products from coal distillation, with explosives and dyes as finished products; petroleum; fats and oils, soap, and glycerine; paint and varnish; leather and glue; rubber; sugar, starch, and glucose; textiles and paper.

THE MUSEUM OF ANATOMY AND MATERIA MEDICA and the DENTAL MUSEUM are housed in the buildings of the Medical School and the Dental College, respectively, and are described in the chapters devoted to them.

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MUSEUM OF FINE ARTS AND HISTORY

The works of art belonging to the University are installed in the Alumni Memorial Hall. The collections, begun in 1855, include valuable original works, especially American, of the nineteenth century and the contemporary period—notable among the later paintings being portraits by William B. Chase, Gari Melchers, and others, and among the works of sculpture representative examples by Daniel C. French, Karl T. F. Bitter, A. A. Weinmann, and others. The University collections of epigraphy and numismatics, supplemented by an extensive working collection of casts and reproductions, are well known in classical circles. Among the special collections are the following:

The Lewis Collection, bequeathed to the University by Henry C. Lewis, of Coldwater. Among its four hundred and fifty canvases are original works and copies of the Italian Schools of the sixteenth and seventeenth centuries by such well known men as Raphael, Correggio, Sebastiano del Piombo; the French, German, and Spanish schools of the eighteenth century; nineteenth century European masters, such as Benjamin Constant, Schreyer, Van Marcke, Diaz, Bouguereau, Jerome, and early American painters such as Rembrandt Peale, Charles W. Peale, Vanderlyn, and Eastman Johnson.

The Wetmore Collection, presented to the University by Jean A. Wetmore (B.S. 1881, M.S. 1882), including representative canvases by nineteenth century and contemporary European and American artists, such as Crome, Rosa Bonheur, Thomas Cole, Daniel Huntington, J. F. Kinsett, and T. B. Griffin.

The Rogers Collection, given to the University by the sculptor, Randolph Rogers, embraces his entire collection of casts and models of his own works, more than a hundred in number. It forms the chief material for the study of this important American artist.

The De Criscio Collection of Inscriptions, acquired through the generosity of Henry P. Glover, of Ypsilanti, comprises about two hundred fifty original inscriptions in Greek and in Latin, mostly from the neighborhood of Pozzuoli.

The Todd Collection of Egyptian Antiquities was presented by Mr. A. M. Todd, of Kalamazoo.

The collections of coins and medals include the RICHARDS collection of Greek and Roman coins, the HORACE WHITE collection of European medals, and the BAGLEY, FRITCHEY, and JEWETT collections of American medals and coins.

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MUSEUM OF MUSICAL INSTRUMENTS

The Stearns Collection of Musical Instruments, donated by the late Frederick Stearns, A.M., of Detroit, is considered by authoritative critics, both in this country and abroad, one of the most significant of modern collections. It contains about 1,500 examples of every type of musical instrument, and its value for purposes of independent study and original research is heightened by the fact that the scientific aspects of *Instrumentenkunde* have been emphasized rather than mere beauty of form or historic interest. Still these features have not been ignored, as will be observed by a study of the instruments, notably those from India and Japan, while many of the instruments are rich in historical significance.

The collection has recently been arranged in an appropriate room in the Hill Auditorium. A comprehensive illustrated catalogue was published in 1919. Although not formally included in this collection, the Frieze Memorial (Columbian) Organ may be considered as belonging to it, as it is a fine example of organ building in this country at the time of its erection. It was rebuilt and enlarged at the time of its transfer from University Hall to its present location.

The educational aspects of the collection are emphasized by the fact that Mr. Stearns presented to the General Library a very inclusive collection of books bearing on the subject. This feature will be emphasized still more in the near future, when a complete card catalogue of all references to instruments contained in the General Library will be at the command of students.

THE LABORATORIES

In the several laboratories of the University opportunities are provided for practical instruction in physics, chemistry, mineralogy, geology, zoology, psychology, botany, forestry, actuarial work, engineering, histology, physiology, hygiene, electrotherapeutics, pathology, anatomy, and dentistry.

The laboratories designed primarily for students of engineering, of medicine, and of dentistry are described in later chapters.

PHYSICAL LABORATORY

The first floor of the Physics building is devoted to experimental work in heat, electricity and magnetism, and to research. It contains about 8,000 square feet and is divided into fourteen rooms, including a battery room, a large laboratory for advanced work in heat, another large room for electrical measurements, and a smaller one for photometry. Two rooms are used for instruction in direct and alternating current machinery and radio communication, and are equipped

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with various types of machines and apparatus in common use, with the necessary instruments for testing. The rest of the rooms on this floor are used for research.

The battery room contains two storage batteries; one consisting of one hundred and twenty cells, of ten amperes capacity, and one, consisting of eighteen cells, of twenty-five amperes capacity. A switchboard, wired to all parts of the building, serves for the distribution of current from the batteries as well as the 220 and 110 volt direct current from the University power house and the 220 and 110 volt alternating current from the city lines. Compressed air is also available in the rooms.

On the second floor are two lecture rooms, one seating one hundred twenty and the other four hundred students. An apparatus room is adjacent to each lecture room. This floor contains in addition a large laboratory for beginners, the library, offices, and research rooms.

The third floor contains eleven rooms, the two largest of which are used as laboratories for beginners. Two rooms are used as class rooms and the rest for the advanced work in sound, light, and electrochemistry.

The laboratory is well supplied with apparatus from the best European and American makers. The list includes accurate standards for all kinds of physical measurements, a dividing engine, chronograph, and a large number of chemical balances, tuning forks, and resonators, from Koenig. In light, it includes seven spectrometers, two Abbé-Pulfrich interferometers, a Michelson interferometer, a polariscope from Schmidt and Haensch; in heat and electricity, pyrometers, a Callendar bridge, a thermogalvanometer, three potentiometers, several pieces of apparatus for magnetic testing, a Siemens and Halske oscillograph, and many other standard instruments.

The annual budget allows the addition each year of apparatus needed for the work of graduate students and for illustration of recent advances in physics.

CHEMICAL LABORATORY

The Chemistry and Pharmacy building is a modern fire-proof four-story building erected in 1909. It is provided with an efficient ventilation system and its rooms are all well lighted. The total floor area of 104,500 square feet includes 127 rooms, comprising adequate class and lecture rooms, a capacious library and reading room, centrally located dispensing and store rooms with facilities for dispensing on the main floors, and ample laboratory accommodations. The supply of routine materials and apparatus is extensive, as is also the special equipment for research. Facilities for investigations in the various branches of chemistry and pharmacy are provided in numerous well-equipped smaller laboratories interspersed amidst the offices and private laboratories of the teaching staff. The library is in charge

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of a University librarian, and is a part of the regular University Library system. It houses the chemical library and is especially rich in its files of journals, there being full sets of all the important chemical journals, many of which are comparatively rare. All classes in chemistry and pharmacy, excepting physiological chemistry in the Medical Schools, are taught in this building.

NATURAL SCIENCE BUILDING

A four-story fireproof building was erected in 1915 for the use of the departments of botany, forestry, zoology, mineralogy, psychology, and zoology.

The main part of the building is a reinforced concrete skeleton frame with reinforced concrete and terra cotta tile floor construction. The outside walls are finished with cut stone and brick and the window sash is of steel.

On account of its location between the diagonal walk on the one side and North University Avenue on the other, the building is of irregular shape. The approximate measurements are for the north side 243 feet, for the east side 263 feet, for the west side 150 feet; and the south side, with a series of breaks, is made to conform in general with the diagonal walk and trees. A greenhouse is located on the south side at the east corner. The building encloses a court 120 feet across. A corridor about 700 feet in length runs through the center of each floor. There is a clear span of approximately 23 feet between the corridor and the exterior walls on both the campus and court sides. The form of construction gives unusually large windows, and these combined with the light court in the center allow excellent illumination of all rooms. The corridor floors are finished with terrazzo, the floors of the rooms with cement. The building contains 270 rooms. The basement under the first floor contains an extensive tunnel in which is centered the plumbing, steamfitting, and electric work; rooms for the air supply fans; machine rooms for the two freight elevators; and caves for the use of the various departments. Each department is given a section from roof to basement. At the southwest corner on the diagonal walk is located a lecture room seating 500, with a preparation room attached. The lecture table is built in sections; each section runs on rollers and can be taken to any part of the building for the preparation of material. These sections fasten to stanchions set in the cement floor; at the stanchions all sorts of plumbing and electric supplies are available, including low-voltage storage battery current. An isolated and well lighted library for all departments in the building is located above the lecture room. This portion of the building is carried on structural steel.

The building is equipped with a unit system of waste pipes, water, gas, and compressed air, which will enable any change in plumbing to be made at small cost at any time in the future. All

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piping is exposed. There is a vacuum cleaning system throughout. Alternating current is used for power and for lighting and is available everywhere. There is a unit system of distribution of direct current of 220 volts and special outlets for direct current at 75 volts are well distributed. Cistern water and filtered water are available at certain places in the building. The building is well ventilated with a complete air supply and exhaust system. A special separate exhaust is provided for the toilets and certain other rooms. Pneumatic switches and diaphragm motors are used to control ventilation. The temperature is controlled by thermostats.

MINERALOGICAL LABORATORY

The mineralogical laboratory comprises 36 rooms located in the northeast portion of the Natural Science building. A suite of five rooms, designed especially for research, are located on the first floor. Three of these rooms have light-tight shutters, and are provided with piers equipped with water, gas, compressed air, and alternating and direct currents. The packing, store, and grinding rooms are also on this floor. The mineral collections, lecture room, model and apparatus rooms, and an office are on the second floor. The laboratories for the courses in general mineralogy, blowpipe methods, and mineral and rock analyses, several offices, and a stock room are on the third floor. On the fourth floor are the laboratories for lithology, petrography, crystal measurements, and physical crystallography, a small lecture room, and offices for the staff and advanced students. A crystallization room is located in the sub-basement.

The laboratory is well equipped with crystal models, natural crystals, and lecture and working collections of minerals, rocks, and thin sections. There is an excellent equipment of goniometers, polarization microscopes, and other crystallographic-optical instruments necessary for the thorough study of minerals. These instruments are all of the most modern and approved types. The blowpipe and chemical laboratories possess every facility for the qualitative and quantitative determination of minerals and rocks. The equipment of the laboratory is such that special attention can be given to graduate work, and special investigations in mineralogy and petrography.

GEOLOGICAL AND GEOGRAPHICAL LABORATORY

The department of Geology and Geography is located in the Natural Science building. Special laboratories have been provided for the work in general geology, historical geology and paleontology, physiography and other lines of geographic instruction, and economic and soil geology. In addition there have been provided special research laboratories, a map and folio room, the Russell seminary room, photographic dark rooms, and a common departmental library for works treating especially of the natural sciences. The geological

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collections are arranged in a museum room immediately adjoining the paleontological laboratory. Modern lecture and class rooms and a large auditorium for the common use of the several natural science departments supply all necessary facilities for lecture and class instruction. Meteorological instruments are conveniently located on the roof of the building, but the instruments for the study of earthquakes are retained in the observatory.

The collections of economic rocks and minerals which are made use of in connection with the courses in Economic Geology, have been considerably augmented during the past few years through purchase and exchange, so that the occurrence and the associations of the various ores and minerals of economic importance can be well illustrated.

BOTANICAL LABORATORY

The botanical laboratory occupies the southern portion of the Natural Science building. The installation includes a variety of laboratories, private research rooms, and apparatus composing an equipment competent to deal with many of the problems of modern biology. Besides the usual provision for morphological work, there are provided means of working with vacuum and pressure; refrigeration rooms, in which constant temperatures from zero degrees upward may be employed; a greenhouse of 1,400 square feet attached to the main building and divided into several rooms for securing differences of moisture, temperature, and illumination; a larger greenhouse with laboratory and garden, especially for research, located a mile from the laboratory; photographic rooms; equipment for chemical biology and for mycology and plant pathology.

The department also has a cryptogamic herbarium, a phanerogamic herbarium, and a museum. The University owns various tracts of land within and on the borders of the city of Ann Arbor which contain meadows, a bog, a small lake, ponds, and a woodlot. These are all used by the botanical department for field work and ecology.

BOTANICAL GARDEN

In 1913 the University acquired 20 acres of land for a Botanical Garden, on the southwest side of Packard Street just beyond the city limits. This is a tract of level, fertile land with excellent moisture conditions, and is much more accessible for students during the winter months than is the old garden in the Arboretum. The interurban cars pass by the tract and the city cars run within 40 rods.

The Botanical Garden offers excellent opportunities for all phases of botanical instruction and research concerned with growing plants. Its physical equipment includes at present four greenhouses, with a combined area of 7,850 square feet, ample work rooms, a boiler house with modern equipment, and a two-story brick laboratory, with steam

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heat, electric lighting, and water. An important feature of the greenhouses is the provision of five separate rooms for individual research, each with independent ventilation and automatic heat control. Ample space is provided for the propagation and cultivation of plants for experimental purposes. During the past season, six acres of experimental grounds were under cultivation. The Garden offers to a few qualified students unexcelled facilitics for investigation in genetics and practical plant breeding. Recent work has included general research in the genetics of oenothera, and special studies on peas, beans, sugar beets, tomatoes, and other economic plants.

A collection of growing plants for teaching and exhibition purposes is being developed, and contains about seven hundred species, including some of the more important economic and ornamental species of the tropics and a small but representative collection of hardy plants. The Botanical Garden provides for the decoration of University buildings and for annual floral displays.

ARBORETUM

Through the gifts of friends and an agreement with the City of Ann Arbor, the University has come into possession of a parcel of land containing about ninety acres. The city coöperates with the University in developing this tract as a park and arboretum.

The land is within the eastern boundary of the City of Ann Arbor and fifteen minutes' walk from the campus. It has a frontage of more than three-quarters of a mile on the Huron River and includes the well-known School Girls' Glen. The topography is exceedingly varied, the highest point being 185 feet above the river. The soils vary from heavy clay to light sands.

About fifteen acres of hillside and ravine are already covered with native trees, shrubs, and herbaceous plants.

A tentative plan worked out by Mr. O. C. Simonds, landscape gardener of Chicago, and further developed by Professor Tealdi of the department of Landscape Design at the University, contemplates three distinct features: The beauty of the tract as a public park; a collection of native plants, shrubs, trees, particularly those of the Michigan flora; and collections of decorative shrubs, trees, and perennials employed in landscape designs to be represented here for inspection and study by the students and the general public.

ZOOLOGICAL LABORATORY

The zoological laboratory, with a floor space of about 26,000 square feet, occupies the northwest quarter of the Natural Science building and contains 70 rooms. On the first floor are the laboratories of general physiology and ecology, a students' dark room, shop, a small chemical laboratory, refrigerating room, unpacking room,

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preparation room, and store rooms. The second floor is used chiefly for laboratories for classes in beginning zoology, offices, and seminary rooms, the third for laboratories, lecture room, museum, and study room for advanced classes, while the fourth floor is devoted largely to private laboratories and offices for the staff and graduate students. There is an aquarium room on each floor provided with city water, filtered water, cistern water, and compressed air. That on the first floor contains, in addition to many small aquaria, a small fish hatchery and concrete floor tanks for keeping aquaria animals. In the sub-basement is a cave fitted with aquaria. On the upper floor are two small vivaria. These are rooms especially fitted for experimental work requiring temperature control and for light reaction work. A suite of five rooms on the upper floor is devoted to photography. Here are a well lighted photographic gallery, a dark room, and special rooms for photomicrography, enlarging and reducing on both plates and paper, and photographic storage.

There is a good equipment of microscopes, of microtomes, of Zeiss's photographic apparatus, and of other accessories. For illustrative purposes, there is a collection of alcoholic specimens (many of them from the Naples Zoological Station), and a full collection of Lueckart and Nitsche's, and other wall charts. For field work there are provided collecting apparatus and field glasses for the individual use of students and photographic cameras, a boat, and larger pieces of collecting apparatus for collective use.

PSYCHOLOGICAL LABORATORY

The psychological laboratory occupies a portion of the Natural Science building. The available space is cut into 40 rooms. On the first floor are located a class room, a shop, a research room with light-tight shutters and containing a concrete pier set in a bed of sand, a small storage room, rooms for keeping animals, and a room especially designed for work with the maze and for other work in comparative psychology. The second floor has offices and private laboratories for the staff, a phonetics room, dark rooms, and rooms with light-tight shutters and light walls for work in comparative psychology. Nine rooms, including a dark room, olfactory room with exhaust hood, chronometric rooms, etc., for use by the general experimental class are on the third floor. On the fourth floor are a sound-proof room, other connected rooms for acoustics, a series of research rooms, and a system of dark rooms in which a clear space over sixty feet in darkness may be obtained. These dark rooms may be used in various combinations and have an optics room with neutral gray walls in connection. The optics room and dark rooms have north windows as well as skylights, all of which are equipped with light-tight shutters.

All rooms are wired so that they can be interconnected through a central switch-board system and also supplied with low-voltage cur-

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rents from dynamotors and storage batteries. Tubes in the walls and in the floor slab make possible other connections between several rooms. All parts of the laboratory are well supplied with alternating and direct current, waste, gas, and compressed air.

Lectures to large classes are given in the main lecture room of the building. The laboratory is located adjacent to the library in which practically all psychological journals are on file.

Facilities for the study of those sides of animal behavior with which this laboratory is not well supplied, are provided in neighboring rooms belonging to the zoological laboratory.

The equipment includes a complete set of apparatus for the work of elementary experimental classes, models of the brain and sense organs, Hipp chronoscopes, kymographs, a large pendulum and gravity chronograph to regulate the registration apparatus, Meumann's time sense apparatus, a Marbe mixer, a Musil rotator, a practically complete set of Herings instruments for color determinations, apparatus for testing the accuracy of indirect vision, a Müller cylinder episkotiser, a Dodge tachistoscope, Dodge photographic apparatus, a Marbe sound recording apparatus, a complete set of Verdin's instruments for investigating speech, forks by Koenig and Edelmann, a modified Wien apparatus by Kohl for determination of sound intensities, Stern tonvariators, a modified Wirth memory instrument, and a considerable number of instruments devised in this laboratory and made in the University instrument shops. The equipment for work in sound and phonetics, for comparative psychology, for studying the learning processes, and for investigating the relations between physiological processes and metal states is particularly large; but every field is represented.

Such apparatus as is needed for advanced work or research will be procured as required. Every facility and encouragement is offered to students of sufficient preliminary training to undertake investigation on special problems.

FOREST LABORATORY

In the forest laboratory students receive instruction in forest botany, timber physics, structure of woods, and certain features of wood technology, as well as in forest measurements and the methods of study of the growth of timber. A good collection of wood specimens, sections of trees, and herbarium material is provided and will be increased as rapidly as possible. There is an ample supply of microscopes, compasses, calipers, height measure, and other apparatus for use in the laboratory and in the field.

FOREST NURSERY

A special nursery for the propagation of forest trees within ten minutes' walk of the campus has been developed. This nursery is equipped to demonstrate certain phases of silvicultural work and the

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methods of commercial nursery practice from the preparation of the seed beds to the packing for shipment of the mature seedling. Quarters are provided on the grounds for the proper accommodation of students working in the nursery and for the detailed study of nursery work and investigation.

SAGINAW FOREST FARM

Special facilities for the study of forestry are supplied by the Saginaw Forest, a tract of land about one mile west of the city of Ann Arbor, presented to the University by the Honorable Arthur Hill, of Saginaw. The farm, comprising eighty acres, is a typical example of the low hilly land of the drift district, and contains as great a variety of topographical and soil conditions as could be expected in an area of this extent. Its soils vary from heavy clay to sandy gravel. In addition to its other good features, there is a lake of clear water, from ten to fifty feet deep and covering an area of twelve acres.

The farm is to serve as an object lesson in forestry. Upon it provision is to be made for (1) an arboretum of all useful forest trees that can grow in Michigan; (2) model plantations of forest trees, and (3) special experiments in forestry, relating to various methods of propagating different kinds of timber, to the raising of particular forest products, and to other practical purposes.

THE EBER WHITE WOODS

The Eber White woods is a tract of native hardwoods located just outside the city limits of Ann Arbor and therefore within easy walking distance for students of the University. It contains about forty-three acres, varying from level to steep rolling ground, and has the usual variety of soil from sandy land to clay and gravel. It is well drained, with a small live brook flowing through one corner. The forest was cut over for local use many years ago, but a part of the old white and red oak timber is still standing. It is planned to manage this woods as a selection forest on a ten-year period of return, and make it serve in this way as an object lesson, practice ground, and experiment plot for the courses in forestry; and at the same time to treat it as a park-forest, preserving, as far as possible, its beauty for the enjoyment of the many visitors.

STATISTICAL LABORATORY

This laboratory is equipped with various instruments to facilitate the computation and tabulation of statistics; among these may be mentioned Hollerith sorting and tabulating units, one twenty-figure Millionaire arithmometer, one sixteen-figure Millionaire arithmometer, and one thirteen-figure Brunsviga arithmometer. Students

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are instructed in their use in the preparation and tabulation of premiums, reserves, and other schedules required in the practical work of insurance offices and statistical bureaus. The laboratory also contains a working library comprising complete sets of most of the important actuarial journals and text-books on actuarial theory. Reports on vital and other statistics are drawn from the general library when required.

LANTERN SLIDE SHOP

The lantern slide shop, situated in the basement of the Physiology building, has been extensively enlarged and remodelled. The dark-room is now fully equipped for printing and developing lantern slides, enlargements, and contact prints. Especial attention is given to glossy prints for reproduction. In the copy-room a new artificial lighting system has been installed, which gives a light photographically the same as daylight. It is thus possible to procure a true rendering of halftone under all weather conditions. A "Semper Focal" enlarging and reducing camera permits the making of lantern slides directly from the original negative regardless of its size.

The shop is under contract to give the University work precedence under all circumstances, but as the shop is now arranged, the out-put capacity is so much increased as to ensure prompt handling not only of large University orders, but also of a limited amount of outside work.

OTHER FACILITIES FOR INSTRUCTION

For descriptions of the various laboratories, shops, museums, etc., used in connection with the work in the professional schools and colleges, see the chapters on the several schools and colleges.

THE HOSPITALS

There are two hospitals connected with the University, affording ample facilities for clinical instruction. One of them is under the direction of the Faculty of the Medical School; the other is in charge of the Faculty of the Homœopathic Medical School. Further information in regard to the hospitals is given in the chapters on the medical schools.

MORAL AND RELIGIOUS INFLUENCES

The churches of the city of Ann Arbor are cordially thrown open to the students, whose interests are largely consulted by the pastors in their pulpit instruction and in their plans of work. There are

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churches of the following communions in the city: Baptist, Congregationalist, the Disciples, English Lutheran, German Lutheran, German Methodist, Methodist Episcopal, Presbyterian, Protestant Episcopal, Roman Catholic, and Unitarian.

The Students' Christian Association, with departments for men and women, is an organization of the campus which devotes itself to moral and religious culture; always for the purpose of assisting the various churches in their work with students. This is done through voluntary Bible and Mission study, religious education, religious meetings, social service and deputation work, personal attention, in coöperation with the churches and student Guilds.

The work for young men centers in Lane Hall, a fine structure two blocks from the campus, completed in 1917. The building is planned strictly for religious and restricted social purposes, leaving to the University gymnasium and the Michigan Union the physical and larger social features. On the basement floor are public and private dining and committee rooms, and the caretaker's apartments. The main floor is devoted, with the exception of a large reading room, to administration, with offices for the secretaries, the employment bureau, and the denominational representatives at Ann Arbor. The second floor has a commodious auditorium, and guest rooms. The men's organization has several thousand members with a general secretary and the student cabinet at the head. The employment department last year gave out a large number of jobs and assisted college men in earning a very considerable sum.

The work for the college women is carried on in Newberry Hall, on State Street opposite the University campus. The general secretary and three assistant secretaries conduct the women's activities. The outstanding features are the weekly vesper services, the religious education classes and the social service work. The organization has over 1,500 active members and 241 honorary members.

Guilds and other societies, consisting chiefly of students, have been organized in several of the churches both for religious and moral culture and for social entertainment. The Hobart Guild, connected with St. Andrew's Church (Protestant Episcopal), has a commodious building, called Harris Hall, planned and equipped for the objects of the guild; and two of the several lectureships contemplated in its plans have been endowed,—The Baldwin Lectureship for the Establishment and Defense of Christian Truth, and the Charlotte Wood Slocum Lectureship on Christian Evidences. The work is under the immediate charge of a Curate.

The Tappan Presbyterian Association owns the buildings known as McMillan and Sackett Halls. Its active work centers about the Christian Endeavor Society of the local Presbyterian Church.

The Methodist Episcopal Church has organized the Wesleyan Guild, and has a permanent fund for the support of the Henry M. Loud Lectureship. The work is in charge of a Religious Director.

The hall of the Baptist Students' Guild (Tucker Memorial),

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opposite the First Baptist Church, is the center of work among Baptist students. The two upper floors are the residence of the Guild Director, while the first floor, with its library, reading and music room, and office, is used for general social and religious purposes. The Guild also employs a director who devotes his whole time to the student work.

The Young People's Religious Union is a society formed in the Unitarian Church with similar purposes.

The society organized in connection with the Church of the Disciples is called the Inland League.

All Catholic students are expected to become members of the Students' Catholic Club, which has its headquarters at the new Catholic Chapel. The society is under the personal supervision of the pastor of St. Thomas' Church. Its object is both social and religious.

The Jewish Student Congregation, which is open to all Jewish students, meets weekly on Sunday evenings in Lane Hall.

The Christian Science Society was formed in accordance with the Manual of the First Church of Christ, Scientist, in Boston, Mass. Faculty, students, and alumni of the University are invited to attend the meetings.

The Ann Arbor Bible Chair is an organization partially supported by the Church of Christ (Disciples) offering excellent courses in the study of the Bible. The work is carried on in Lane Hall.

The Michigan Menorah Society is an organization, open to all members of the University, devoted to the study and advancement of Jewish culture and ideals. It attempts, formally through the regular University courses, and informally by means of special lectures, original papers, and free discussion, to stimulate an interest in, and spread a knowledge of the history, the literature, the religion, and the current problems of the Jewish people. It is affiliated with the Intercollegiate Menorah Association.

FACILITIES FOR PHYSICAL TRAINING

Gymnasiums

The University has two gymnasiums, one for men and one for women, erected at a cost of about $200,000. The former is called the Waterman Gymnasium; the latter, the Barbour Gymnasium. In the conduct of the gymnasiums the aim is not so much the development of a few gymnastic experts as the provision of wholesome physical exercise for the many. The facilities of the building, including the physical examinations (which every locker holder must take) and instruction, are free to all students, the only charge being a rental of $2 a year for a locker for men students, $1 for women.

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PHYSICAL TRAINING FOR MEN

The Waterman Gymnasium

Waterman Gymnasium, named in honor of the late Joshua W. Waterman, of Detroit, who contributed largely to its cost, affords excellent opportunity for all phases of gymnastic and indoor athletic activities. The main floor is a rectangle 246 by 90 feet, with truncated corners, allowing if desired a 75-yard straight-away sprinting track. There is also a dirt pit for jumping and shot putting, covered by a trap door when not in use, as well as equipment of the various kinds of apparatus usually found in the best modern gymnasiums. Several smaller rooms are devoted to administration, fencing, boxing, and other special purposes, while the basement is given up to baths, lockers, handball, and shotput. The main hall is lighted in the daytime through a large skylight sixty-six feet above the floor, and in the evening by electricity. A gallery makes room for an elliptical running track, ten laps to the mile.

Work in the gymnasium, twice a week, is required of all freshmen men in the College of Literature, Science, and the Arts, and the Coll ges of Engineering and Architecture; the credit is not recorded, however, in semester-hours. The work begins on the first Monday in November, but students are required to report to the Director of the Gymnasium between October 1 and 20 to make appointments for assignment to sections. Everyone using the gymnasium either for exercise or bathing must procure a locker, and in order to secure the best possible hygienic and sanitary conditions, only one man is allowed to occupy a locker. These rules are strictly enforced. Locker tickets should be purchased from the University Treasurer.

During October, before beginning gymnasium work, each student receives a thorough medical and physical examination, in order to eliminate those who are not physically capable of doing the regular class work. The appointment for examination is made by card, distributed at the time University fees are paid. Every student examined is measured and furnished with an anthropometric chart, which affords a comparison of his own measurements with those of the average student and reveals for correction any abnormality that may be present. A second measurement is made after the class work is finished, in order to note what changes have taken place.

The required work in Physical Training is planned to produce uniform development, which is of the greatest importance; special attention is given to arm and chest exercises, since the development of these parts of the body is below normal in a great majority of the men who come to college. In order to be interesting, however, the work is varied, and consists of athletic exercises, as well as gymnastic drills and apparatus work. Credit towards the requirement in physical training is given for outdoor sports in season, such as class football, soccer, ice hockey, and cross country running, provided that those who desire to engage in these sports make proper arrangements

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with the Director of the Gymnasium. After the close of the season for these sports, students participating in them must report for regular indoor work. An outdoor running track has been constructed adjacent to the gymnasium, in order to encourage outdoor running when weather conditions permit.

A course of lectures on personal hygiene is given as a regular part of the required work.

Advanced Classes in Athletics and Gymnastics for Those Desiring to Coach or Teach

Every year a number of good positions are open, along the line of General Physical Training. Schools and colleges desire to secure, if possible, college men for this work. In order to meet this demand, it is planned to offer a course in Physical Training, which will cover most of the important details. No University credit will be given for this course, but prospective candidates must identify themselves with this course, and do satisfactory work in both theory and practice, in order to secure recommendation as to ability, etc.

Classes in Coaching Competitive Athletics

Classes will be offered in the theory and practice of coaching. These classes will be conducted in the four major branches of competitive athletics: football, baseball, track and field athletics, and basketball. Members of the classes will be given actual coaching to do, and will meet twice weekly for recitation and quiz, covering the work done.

Classes in Gymnastics and General Physical Training

Lectures and quizzes will be held in anthropometry, first aid, methods of teaching, growth and development, and gymnastic nomenclature. Particular attention will be given to the development of proficiency in practical gymnastic apparatus, and in squad leadership in calesthenic exercises. Enrollment for these classes should be made as soon as possible after the beginning of college. For further detailed information, apply to Dr. G. A. May, Director of Waterman Gymnasium, for work in Gymnastics and General Training, and to Mr. E. D. Mitchell, Director of Intramural Athletics, for work in Competitive Athletics.

Intramural Activities

Steps have been taken to furnish competent and adequate instruction, in all branches of athletics, to all students in the University desiring such instruction.

Any student applying for special instruction, or attention, in any branch of athletics will now receive the attention of a competent coach, regardless of the athletic ability of the applicant.

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It is also hoped that the work will be of such a nature as to stimulate the growth of all athletic activities, especially of a Non-Varsity character.

Dexter M. Ferry Athletic Field

By the generosity of Mr. Dexter M. Ferry, of Detroit, an addition of about twenty-five acres has been made to the grounds formerly known as Regents' Field. The combined tract of thirty-five acres lies a few minutes' walk southward from the campus, and is set apart and equipped especially for open-air sports. It contains a club house, stadia, gridiron, diamond, tennis courts, and tracks for intercollegiate athletics, and similar grounds for interclass and intramural sports.

Anticipating the growth of interclass athletics and the consequent necessity of additional field space, the Athletic Association has purchased thirty-eight and seven-tenths acres of land immediately adjoining Ferry Field on the south.

Supervision of Athletic Sports

The general supervision of athletic sports is vested in a Board of Control, consisting of eleven members.* The Board thus constituted has charge of all matters involving the relation of athletic sports to the University; for example, the eligibility of players proposed for any University team, the arrangement of intercollegiate games, the granting of leaves of absence, and the investigation of charges of misconduct on the part of players. The policy of the Board is to foster the spirit of honor and gentlemanliness in athletics, to suppress evil tendencies, and to see that play shall not encroach too much upon the claims of work. For the furtherance of these ends certain specific rules and regulations have been adopted, a copy of which can be had on application to the Secretary of the University.

PHYSICAL EDUCATION FOR WOMEN

The Barbour Gymnasium

The Barbour Gymnasium is named in honor of the Honorable Levi L. Barbour, of Detroit, a former Regent of the University and a liberal contributor to the funds for its erection. The building contains, in addition to the gymnasium proper, the offices of the Dean of Women and the Director of the Gymnasium; a club room and parlors for the college women, a hall (Sarah Caswell Angell Hall)

* The Board of Control for the year 1920-1921 consists of Professors Aigler, Johnston, Gram, and Frayer, and Mr. Philip G. Bartelme, of the University faculties, Messrs. John D. Hibbard, James E. Duffy, and Charles B. Du Charme, of the Alumni Association, and Messrs. Alan W. Boyd, David A. Forbes, and Robert Cook, of the student body. Mr. Bartelme is Director of Outdoor Athletics.

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accommodating 550 people, for lectures, meetings, theatrical entertainments, etc. The gymnasium is a large room with floor space 90 x 80 feet, well lighted, well ventilated, and amply equipped with the necessary apparatus for individual and class work. The gallery has a running track 310 feet long. The basement contains dressing rooms, shower baths, and a swimming tank which is open to all women registered in the gymnasium, with instruction in swimming free of charge. Before beginning the gymnasium work each student receives a careful medical and physical examination made by the University Physician for Women, and the Director of the Gymnasium, and the work is assigned accordingly. If a girl is physically unable to undertake the general class work she is given individual work carefully adapted to her own need. Especial attention is given to the correction of faulty posture and any deformity that may be benefited by intelligent exercise. Tennis, baseball, team games, cricket, hockey, and archery, form part of the fall and spring work.

Palmer Field

The Women's League has purchased, with the help of the Alumnæ and a very generous gift from the Honorable Thomas W. Palmer, of Detroit, a tract of seven and one-quarter acres of land situated within five minutes' walk of the gymnasium. Hockey and baseball fields, tennis courts, and an archery range provide ample opportunity for varied outdoor exercise.

Class Work

All freshman and sophomore women students in the College of Literature, Science, and the Arts, and the Colleges of Engineering and Architecture are required to complete satisfactorily, without credit in semester hours, a course in Physical Education in accordance with the outline stated below. The gymnastic work announced for freshmen and sophomores is a regular academic requirement, and as such, is subject to the usual regulations in regard to absence and quality of work.

All freshman and sophomore women students are given a careful medical and physical examination. Other students taking work in this department are required to have a heart and lung test each year.

A regulation costume of white blouse, black bloomers, and black gymnasium shoes is required. Owing to the necessity of having uniform gymnasium suits they should *not* be purchased before entering college. If it is necessary to do this, communication should first be made with the Director of the Gymnasium in regard to the material and style required.

Every student is required to purchase a locker ticket from the Treasurer of the University before taking part in any courses offered in this department.

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A. Required work:—For all freshmen and sophomores.

Freshmen—*M, F,* at 10, 11, 2; *Tu, Th,* at 2, 3.
Sophomores—*M, W,* at 3; *Tu, Th,* at 10, 11, 4.

I. Fall and Spring work consists of elective sports; archery, baseball, basketball, hockey, tennis, and cricket.

II. Winter work, from Nov. 10th approximately, until Spring vacation. Consists of practical gymnastics, corrective gymnastics, and light gymnastics. Students are placed in these classes in accordance with the results of their medical examination. Hours for corrective and light gymnastics to be arranged.

III. Hygiene lectures. All freshmen and entering sophomore students are required to attend a course of lectures on personal hygiene.

B. Elective work:—

I. Advanced gymnastics. Open to students who have completed the required work in this University or in another institution of collegiate grade. Two hours a week. Hours to be arranged.

II. Æsthetic dancing. Beginning and advanced classes. Hours to be arranged.

III. Sports:—

a. Outdoor. Archery, baseball, basketball, hockey, and tennis. Hours to be arranged.

b. Indoor. Basketball, and swimming. Each two hours. Hours to be arranged.

IV. Normal course in playground work. Includes lectures and practical work in folk dances and games. Practice teaching in the public schools during the Spring term is required of all who elect this course. Not open to freshmen. One hour a week during Winter term. Two hours a week during Spring term. Hours to be arranged.

MILITARY SCIENCE AND TACTICS

The department of Military Science and Tactics has been re-established and is conducting courses which are open to election for credit towards graduation by students of the College of Literature, Science, and the Arts, and the Colleges of Engineering and Architecture. The Reserve Officers' Training Corps is organized under authority of Act of Congress of June 3, 1916, as amended by Acts of Congress of September 8, 1916, July 9, 1918, and June 4, 1920. Two units of the R. O. T. C. have been organized, and the satisfactory completion of the courses of any unit leads to a commission in the Reserve Corps of the corresponding branch of the army.

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The existing units consist of the Coast Artillery Unit, open to all eligible students of the two Colleges mentioned, and the Signal Corps Unit, open only to students pursuing the curriculum in Electrical Engineering.

Eligibility to membership is limited to male students who are citizens of the United States and whose bodily condition indicates that they are physically fit to perform military duty, or will be at the time of graduation. No member of the army, navy, marine corps, naval militia, or reserve officer of the military or naval forces is eligible for membership. Enrollment does not make a student liable to any service under the War Department.

The primary object of the R. O. T. C. is to provide military training for the purpose of qualifying selected students as reserve officers in the military forces of the United States. This object is attained during the time that students are pursuing their general or professional studies, and with the least practicable interference with their civil careers. The aim will be to give all students of the R. O. T. C. a thorough physical training, to inculcate in them a respect for lawful authority, to teach the fundamentals of the military profession, leadership, and the special knowledge required to enable them to serve efficiently in the various branches of the military service.

Courses

The courses are divided into two periods: the Basic Group and the Advanced Group. The Basic Group consists of the first two years in the military department, with an optional period at a summer camp, usually at the end of the first year. The Advanced Group consists of the last two years in the military department, with a second and required period at a summer camp, usually at the end of the third year. For good reasons, changes in the time of attendance at summer camps may be obtained upon application. Attendance at the Basic Camp is voluntary on the part of the student. Attendance at the Advanced Camp is compulsory for students who receive commutation of subsistence, and is a prerequisite for graduation for those students. Theoretical instruction is given mainly during the academic years; practical instruction mainly in the summer camps. Two hours per week of physical education is required of all students electing this work. A member of the R. O. T. C. engaged in college athletics may be excused from the regular classes in physical training while so engaged.

Elections and Credit

Students electing Military Science and Tactics do so for the four courses of one of the Groups. The first election is for the four courses of the Basic Group, after which, if recommended for further training, the student may elect the four courses of the Advanced Group. Mere enrollment with the Officers of the R. O. T. C. does

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not constitute registration; the student must include his Military course in his regular college election, made in the usual way, at the regular time. One semester hour credit is given for each of the four courses of the Basic Group; two semester hours for each of the four courses of the Advanced Group. No additional credit towards graduation is given for the summer camps. More than the regular maximum number of hours, whether partly military or wholly academic, may be elected only subject to the regulations governing extra hours.

The completion of all four courses composing either group, when once entered upon, is a prerequisite for graduation. The Advanced Group includes the Advanced Camp.

Upon the recommendation of the Professor of Military Science and Tactics, a student may be discharged from the R. O. T. C. by the appropriate University Authority and from the necessity of completing the courses as a prerequisite for graduation.

A member of the R. O. T. C. who withdraws from one university and enters another is not released from his obligation, but must complete the courses undertaken (either basic or advanced) as a prerequisite for graduation if the second institution maintains a corresponding unit of the R. O. T. C.

Commutation of Subsistence

When any member of the R. O. T. C. has completed the four courses of the Basic Group, of its equivalent, he may, if otherwise qualified, be admitted to the Advanced Group. Any member of the Advanced Group who executes the following written agreement will receive, when not rationed in kind, the commutation of subsistence fixed by the Secretary of War:

Ann Arbor, Michigan, ..., 192..

In consideration of commutation of subsistence to be furnished me in accordance with the law, I hereby agree to continue in the Reserve Officers' Training Corps during the remainder of my course in the University of Michigan (not to exceed two years), to devote five hours per week during such period to the military training prescribed, and to pursue the course of camp training during such period, prescribed by the Secretary of War.

.....

Witness.....

Commutation of subsistence has been fixed for the present year at fifty-three cents per day and is paid from the date of the contract until the completion of the course, including the usual vacation periods.

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UNIVERSITY EXTENSION DIVISION

The Extension Division of the University of Michigan was organized to furnish to the state at large such forms of public service as may legitimately be rendered by a state University. The activities of this Division are administered through the medium of twelve bureaus, which coöperate with the departments of the various Schools and Colleges of the University. These twelve bureaus are as follows: Bureau of University Extension Courses, including (a) free extension lectures, (b) extension courses in series, and (c) university credit courses; Bureau of Visual Instruction; Library Extension Service: Public Speaking and Debating; School and Community Dramatics; Municipal Reference Bureau; Educational Service, department of Education; Museum Extension Service; Civic Improvement; Forestry Extension Service; Engineering Extension Service; Public Health Service.

In connection with this extension service the University of Michigan seeks to operate, as far as possible, through the avenues of established university channels; that is, it seeks to make use of such existing university facilities as are available, and thereby to give to the state the largest possible measure of public service commensurate with the equipment and facilities of an educational institution of university grade.

A special bulletin, descriptive of the work of the Extension Service, and such other information as may be desired regarding extension service, may be obtained by writing the Director of the University Extension Division.

ORATORICAL ASSOCIATION

In addition to the University instruction in Public Speaking, an active and earnest interest is fostered and maintained through the agency of a voluntary association of students, which arranges and conducts debates and oratorical contests and coöperates with similar organizations in other institutions.

This Association was organized by students of the College of Literature, Science, and the Arts, and of the Law School, under the guidance of the department of Public Speaking, to foster an interest in oratory and debate, and also to participate in the annual contests of the Northern Oratorical League, the Central Debating League, the Mid-West Debating League, and in such other contests as may be arranged by the association.

At the annual oratorical contest held the third Friday of March, the student who takes first honors, represents the University in the annual contest of the Northern Oratorical League. Freshmen and

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graduates are not eligible to compete. In 1920, the first and second honors were awarded, respectively, to Jacob J. Goshkin and Clifford Taylor McKinney.

Chicago Alumni Medal.—The Chicago Alumni Association of the University of Michigan offers annually a bronze medal as a testimonial for excellence in oratory. The medal, designed by Mr. Louis H. Sullivan, of Chicago, is given to the student who is awarded the first honor in the University Oratorical Contest.

Paul Gray Testimonial.—In 1920, Paul Gray, of Detroit, set aside an endowment of $3,000 for the stimulation of interest at the University in the annual oratorical contest. From the interest accruing therefrom the sum of $100 is awarded to the student receiving first honor at the annual contest, and $50 to the student receiving second honor.

Northern Oratorical League

The Northern Oratorical League is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, the State University of Iowa, the University of Minnesota, and the University of Illinois. Its purpose is to foster an interest in public speaking and to elevate the standard of oratory, by holding annual contests. The contests are open only to undergraduates.

Lowden Testimonial.—To encourage public speaking in the universities whose oratorical associations compose the Northern Oratorical League, the Honorable Frank O. Lowden, of Chicago, in 1901 established an endowment fund, amounting to $3,500, and placed it in the hands of the Regents of the State University of Iowa, as trustees. From the interest annually accruing therefrom the sum of $100 is awarded to the person receiving first honor at the annual contest of the Northern Oratorical League, and $50 to the person receiving second honor.

Central Debating League

The Central Debating League is composed of the debating associations of the University of Michigan, Northwestern University, and the University of Chicago. Its purpose is to discuss, in public, leading questions of the day, and in this way to develop ready and useful speakers. These debates are open only to undergraduates.

Couzens Testimonial.—The Honorable James Couzens, of Detroit, has been providing each year, for several years past, the sum of $300, to be awarded in equal amounts to the six students who shall represent the University in the Central Debating League.

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Alger Medals.—As a memorial to the late Senator Russell A. Alger, who established the Alger Medals, Mrs. Alger contributes annually the sum of $125 for the purpose of furnishing appropriate medals for the six men who appear in the Central League debates.

Midwest Debating League

The Midwest Debating League includes the universities of Michigan, Wisconsin, and Illinois. In this triangular organization each university debating association maintains an affirmative and a negatice debating team. Three debates occur simultaneously, the last Friday in March, one at each university. These debates are open only to undergraduates.

Gray Testimonials.—The John S. Gray heirs, of Detroit, provide annually the sum of $300, to be awarded in equal amounts of $50 as testimonials to the six students who shall represent the University in the Midwest debates.

As a memorial to the late John S. Gray these prizes are designated by his heirs as the *John S. Gray Testimonials.*

Gray Medals.—The John S. Gray heirs also provide annually $125 for appropriate gold medals to be given to the six students who shall represent the University in the debates of the Midwest League. These are to be known as the *John S. Gray Medals.*

Michigan High School Debating League

In 1917 the Extension Division of the University, in coöperation with the department of Public Speaking and Library Extension Service, organized the Michigan High School Debating League. Already one hundred twenty schools have joined the League. The League seeks to promote effective public speaking and the use of good English and to stimulate public discussion of state and national questions. Preliminary debates are held looking towards a state debate to be held in Ann Arbor on Friday night of the interscholastic field meet. Further information may be obtained from Ray K. Immel, Assistant Professor of Public Speaking, The University.

Lecture Course

In addition to the local and intercollegiate contests in debate and oratory offered on its course, the Oratorical Association provides each year, at a low price of admission, an attractive course of lectures and readings, with the special end in view of developing a strong interest in the art of public speaking in the University community, and of affording opportunity of seeing and hearing the most distinguished authors and public men of the day.

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OTHER UNIVERSITY ORGANIZATIONS

The Michigan Union

The University of Michigan Union was organized and incorporated under the laws of the State of Michigan in 1904 to establish a University social center; to provide a meeting place for faculty, alumni, former students, and resident students of the University; to furnish a home for alumni when in Ann Arbor, and a place for wholesome relaxation for students, so that their leisure time, their amusements, and their student interests, through the medium of the University atmosphere of the Union, might become a component part of their education. The Union, furthermore, seeks to inculcate educational ideals through its student activities; for as a social center it encourages and stimulates activities that are for the welfare and enjoyment of the student body, and the result is a richer, more intense University life, a product of the students' own work. This develops group-spirit, a sense of loyalty to the community served, pride in work accomplished, a widened circle of friendships, and broadened experience and viewpoint of life. The Union, in emphasizing the social values of education, complements the work of the University in its endeavor to graduate "broadly" educated men and citizens.

The Union serves also as a democratizing influence in the student body. It recognizes no artificial barriers nor distinctions and, seeks to fit Michigan men for the performance of their duties as good citizens.

The government of the Michigan Union is vested in the Board of Directors. It consists of seven students, six alumni, including the General Secretary of the Alumni Association, three members of the Faculty, and the General Manager, Financial Secretary and General Secretary, ex officio. The President, the five Vice-Presidents representing the several schools and colleges in the University, and the Recording Secretary are students. The activities of the Union are conducted through departments in charge of several officers, and through standing and special committees authorized by the Board of Directors. The interests of the Union are as broad as are the student interests. As a result, well over a thousand students are members of some department or committee engaged in Union work. And almost all University men find that the Union enters largely into their University life through the facilities it offers them to employ their time and interests.

The New Union Building is now practically finished. Among its many attractions, the building provides a swimming pool, six bowling alleys, a barber shop, a billiard room with twenty-four tables, a lounging room, restaurant service including a cafeteria, a women's dining room, a main dining room, and an Assembly Hall, adapted to use for banquets, meetings, conventions, smokers, concerts, and dances. Forty-nine sleeping rooms, accommodating 68 persons, and designed

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for alumni and guests of members. The building will be the headquarters and gathering place for all Michigan men to which students, alumni, former students, and faculty are eligible.

The entire cost of the land, building, and equipment has been met by gifts of alumni, students, and friends of the University, without any cost whatsoever to the State. About twenty thousand members of University's constituency have subscribed to this splendid gift.

Between twelve and fifteen hundred meetings including informal lectures, class and departmental meetings, dinners, and society affairs are held at the Union during the year. Departmental faculty meetings are held at the Union periodically for the discussion, in an informal way, of questions relating to the University departmental affairs.

The Union maintains rooming and boarding lists and furnishes other activities for the benefit of the student body, and in conjunction with the University Y. M. C. A. assists students in finding employment.

The kinds of membership to which all Michigan men are eligible are as follows:

Student Annual Membership.—Fee, $5.00, fixed by the Board of Directors, and by Resolution of the Board of Regents adopted June 14, 1918. This fee is incorporated in the annual tuition of every man student of the University.

Non-Resident Annual Membership.—The Constitution provides that persons eligible to membership who live at a distance greater than 60 miles from Ann Arbor are classified as non-resident members and annual dues for such members are set at $5.00 a year.

Resident Annual Members.—Provision is also made for persons eligible to membership who live within the 60-mile radius. By such members the resident membership of $10.00 is paid annually.

Life Membership.—Fee, $50.00 for students during their last year of residence at the University of Michigan, or within one year thereafter; $100.00 for all other persons eligible for membership.

Participating Life Members.—The constitution provides for the payment of life membership dues in five equal annual installments. During the period of these payments the applicant is enrolled as a participating life member and upon payment of the last installment becomes, ipso facto, a life member.

The Women's League

The Women's League, organized in 1890, is the clearing house for all women's activity in the University. It aims to unify the women in the interests of the University, both academic and social.

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Every University woman is a member of the Women's League by virtue of the membership fee of one dollar which is included in the registration fee of the University. In the thirty years of its activity the Women's League has assisted in raising funds for Barbour Gymnasium and the parlors which serve the purpose of a women's building; for Palmer Field, the women's athletic grounds; and it has been the spiritual pioneer in the movement for residence halls, resulting in the gifts of Helen Newberry Residence, the Martha Cook Building, Alumnæ House, and Betsy Barbour Residence. The work of the Women's League is carried on by a system of committees. The Social Committee and the House Committee coöperate to make the parlors connected with Barbour Gymnasium the center of social activities among all University women. The Intercollegiate Committee organizes an advisory system by which entering upperclass women are assisted, during registration and throughout the year, to establish themselves in the unity of the University. The Vocational Conference Committee arranges each year for a series of meetings and speakers upon vocations open to women, and particular stress is laid upon the preparation which women may make in the University for these vocations.

The Judiciary Council is the self-government branch of the Women's League. This Council has charge of such matters of conduct and House regulation as are referred to it by the Board of Directors of the Women's League and the Dean of Women.

The University Musical Society

The University Musical Society is a body corporate, organized under Article 171 of the Public Acts of Michigan of 1903, entitled "An act for the incorporation of associations not for pecuniary profit." Its purpose is "to cultivate the public taste for music and afford opportunities for the acquisition of musical knowledge and skill," and to this end it is empowered to establish and maintain "a school of music, a choral society, an orchestra, and to give public concerts." Its membership is limited to the original incorporators and officers and graduates of the University. Its fees for tuition, concerts, etc., are placed at the lowest possible point compatible with sound business principles, the financial side serving but as a means to an artistic and an educational end.

THE UNIVERSITY SCHOOL OF MUSIC.—The University School of Music, situated in Ann Arbor, gives systematic instruction in vocal, instrumental, and theoretical music, such as the University does not undertake to provide. It possesses an ample and highly trained faculty. Students above the rank of freshmen in the College of Literature, Science, and the Arts, of the University may, with the permission of the head of the department of Music in the University, elect not to exceed two hours per semester of practical music in the School

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of Music to count towards the University degree. Catalogues may be obtained by addressing Professor A. A. Stanley, Director, The University School of Music, Ann Arbor, Michigan.

THE UNIVERSITY SYMPHONY ORCHESTRA.—A complete orchestra of about sixty members from the University and the School of Music receives thorough training under the head of the Violin Department of the School of Music. It gives several public concerts during the year.

THE UNIVERSITY CHORAL UNION is an organization of students and others, for study and practice of choral music under the direction of the professor of music in the University, and for the promotion of general music culture. It is one of the largest student musical organizations in the world. Each year it takes part in the Annual May Festival by contributing several of the larger choral works.

Under the auspices of the University Musical Society the following courses of concerts are announced for the year 1920-1921:

CHORAL UNION AND MAY FESTIVAL SERIES

PRE-FESTIVAL CONCERTS

1. Oct. 29, 1920, Sextette from the Metropolitan Opera Company, in a program of excerpts from Verdi and Puccini Operas. Marie Rappold and Nina Morgana, Sopranos; Helena Marsh, Contralto; Giovanni Martinelli and Guiseppe Corallo, Tenors; Thomas Chalmers, Baritone; Emilio Roxas, Pianist.
2. Nov. 11, Sergei Rachmaninoff, Pianist.
3. Dec. 13, Jan Kubelik, Violinist; Pierre Augieras, Pianist.
4. Jan. 24, 1921, The Detroit Symphony Orchestra, Ossip Gabrilowitsch, Conductor.
5. Feb. 21, The Detroit Symphony Orchestra, Ossip Gabrilowitsch, Conductor; Philipp Abbas, Violoncellist.
6. Mar. 7, The Detroit Symphony Orchestra, Ossip Gabrilowitsch, Conductor; Marcia Van Dresser, Soprano.

TWENTY-EIGHTH ANNUAL MAY FESTIVAL

7. May 18, 1921, First May Festival Concert: Miscellaneous program.
8. May 19, Second May Festival Concert: "Elijah" (Mendelssohn).
9. May 20, (Afternoon) Third May Festival Concert: Children's Concert.

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10. May 20 (Evening) Fourth May Festival Concert: Miscellaneous program.

11. May 21, (Afternoon) Fifth May Festival Concert: Symphony concert.

12. May 21 (Evening) Sixth May Festival Concert: "Aida" (Verdi).

Among the organizations and soloists announced for the Festival at the time of going to press, are the following: The University Choral Union, Albert A. Stanley, Conductor; Children's Chorus, George Oscar Bowen, Conductor; the Chicago Symphony Orchestra, Frederick Stock, Conductor; Rosa Raisa, Florence Hinkle, and Rosa Ponselle, Sopranos; Merle Alcock and Carolyn Lazzari, Contraltos; Tito Schipa, Orville Harrold, and Giacomo Rimini, Tenors; Theodore Harrison, Arthur Middleton, Baritones; Carles Tittman, Bass; Alfred Cartot, Pianist.

EXTRA CONCERT SERIES

1. Nov. 4, 1920, Albert Spalding, Violinist; Andres Benoist, Pianist.

2. Nov. 13, United States Marine Band, William H. Santleman, Leader.

3. Dec. 2, Percy Grainger, Pianist.

4. Jan. 10, 1921, The Flonzaley String Quartet.

5. Feb. 28, The New York Chamber Music Society, Carolyn Beebe, Director.

FACULTY CONCERT SERIES

1. Oct. 24, 1920, William Wheeler, Tenor; Samuel P. Lockwood and Marian Struble, Violinists; Albert Lockwood, Pianist.

2. Nov. 14, University Symphony Orchestra, Samuel P. Lockwood, Conductor; Marian Struble, Violinist.

3. Dec. 5, Mrs. William Wheeler, Soprano; Mrs. Maud Okkelberg, Pianist; Samuel Pierson Lockwood, Violinist; Accompaniments by Mrs. Okkelberg and Mrs. George B. Rhead.

4. Dec. 12, Mass Singing, George Oscar Bowen, Leader; University Band, Wilfred Wilson, Leader.

5. Dec. 16, Christmas program by school children, George Oscar Bowen and Lulu M. Allen, Leaders.

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6. Dec. 26, Christmas program, Earl V. Moore, Organist.
7. Jan. 9, 1921, Mrs. Grace Johnson Konold, Soprano; Marian Struble, Violinist; Mrs. George B. Rhead, Pianist; Accompaniments by Mrs. Rhead and Mrs. Dorothy Wines Reed.
8. Jan. 16, University Symphony Orchestra, Samuel P. Lockwood, Conductor.
9. Jan. 30, To be announced.
10. Feb. 13, To be announced.
11. Feb. 27, University Symphony Orchestra, Samuel P. Lockwood, Conductor.
12. Mar. 13, To be announced.
13. Mar. 27, To be announced.
14. April 3, University Symphony Orchestra, Samuel P. Lockwood, Conductor.

Matinee Musicale

The Matinée Musicale is a club of Ann Arbor women, interested in music. In addition to its own regular meetings, it has maintained during the present year the following concert course:

1. Oct. 19, 1920, Ossip Gabrilowitsch, piano recital.
2. Nov. 9, 1920, Charles Carver, basso, and Frank La Forge, composer-pianist, in recital.
3. Feb. 8, 1921, Sascha Jacobinoff, violin recital.
4. Mar. 15, Ypsilanti Normal Choir, Lenten program. Frederick Alexander, director.
5. Mar. 22, Detroit Symphony String Quartette, assisted by Madam Olga Samaroff, pianist.

Philological Society

The Philological Society is an association of all members of the faculties in the departments of the ancient and modern languages, together with such advanced students in these departments as may be proposed by faculty members for election to it. The society holds regular meetings, at which papers embodying the results of original research are read and discussed. Occasionally lecturers are secured from other universities.

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Cercle Francais

In connection with the French department, the Cercle Français offers students an opportunity to improve their pronunciation and their general knowledge of the language through the thorough study and presentation of French dramatic masterpieces. The club is composed of active, associate, and honorary members. All associate members are eligible to election to active membership upon the recommendation of a committee composed of the Director and three student members appointed by the president of the club. Aside from the dramatic performances, the Cercle seeks to further the interest of the French language, literature, and life by weekly lectures given by members of the French department and by distinguished men of letters from abroad.

Circolo Italiano

The aims of the Circolo Italiano are to promote interest in Italian civilization. With this end in view, lectures on Italian arts, literature, science, and Italian culture in general are given from time to time by members of the faculty. Since the Italian language is spoken constantly at the meetings of the club, students of Italian have an opportunity to increase their knowledge of the language. Readings in Italian, and dramatic performances are often given for the entertainment of the members. All University students interested in Italian civilization, and all members of the faculty are eligible to membership in this club.

Sociedad Hispanica

La Sociedad Hispanica de la Universidad de Michigan is a voluntary student organization with a limited number of active members. Associate members, admitted by majority vote of the society, are permitted to take part in all its activities, but do not enjoy the right to vote upon matters of policy or business. The purpose of the organization is to promote interest in the Spanish language and literature, and in the relations of the occidental Latin world to the United States. Throughout the academic year meetings are held fortnightly, with regular literary programs and the general use of Spanish in unconstrained conversation, affording opportunity for practice in the spoken language supplementary to the work of the class room. Incidentally the association will annually give public performance of a standard dramatic work, as well as offer a course of lectures dealing with matters of interest to the general public.

Michigan Dames

The Michigan Dames, an organization composed of the wives of graduate and undergraduate students, was founded in 1914, and now numbers about one hundred members. Its aims are social and educa-

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tional, and special care is taken to make the wives of new students at home in Ann Arbor. All students' wives are urged to become members. Requests for further information should be addressed to The President of the Michigan Dames, Lane Hall.

Other Organizations.—Other organizations of various nature and purposes exist among the faculty and the student body, which cultivate other interests of the University life not so closely connected with the work of any special department.

ADMISSION TO THE UNIVERSITY

The requirements for admission to the various schools and colleges of the University are given in detail in the pages of the Catalogue devoted to those schools and colleges. In brief it may be said that the satisfactory completion of a full four-year course in a standard high school, amounting to at least fifteen units, is required for admission to each of the three colleges, the College of Literature, Science, and the Arts, the Colleges of Engineering and Architecture, and the College of Pharmacy, while one year of collegiate work is required for admission to the College of Dental Surgery, and two years of collegiate work are required for admission to the Medical School, the Law School, and the Homœopathic Medical School.

APPROVED HOUSES FOR WOMEN

Since in the judgment of the University authorities it is deemed wise that men and women room in different houses, all undergraduate women in the University, except those living at home, are required to live in the Halls of Residence, Sorority Houses, or University Houses. All are approved and supervised by the Dean of Women. These houses are supplied with first floor parlors, and in most of them reside a number of responsible upperclass women who make a distinct effort to develop in each group a sense of responsibility and wholesome ideals.

There are at present at the University of Michigan four residence halls for women—Martha Cook Building, Helen Newberry Residence, Betsy Barbour House, and Alumnæ House. The first three of these buildings are fire-proof, four stories in height, and contains elevators. Martha Cook Building will accommodate 117 students; Helen Newberry Residence, 75 students; Betsy Barbour House, 80 students. With few exceptions rooms in all three residences are single. The rooms are heated by steam, lighted by electricity, and furnished. Each residence contains a well equipped laundry and a

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sewing room for the use of residence students. Alumnæ House has been provided through the efforts of alumnæ of the University. It is a two-story building comfortably and attractively arranged and furnished, and accommodates sixteen students. It is operated on the coöperative plan. Each woman in the house is responsible for some part of the light housework, for which she receives fair compensation.

Changes in rooming place may be made only with the approval of the Dean of Women. Rooms should be engaged with a definite understanding as to the period of the lease.

Applications for rooms should be made to the Dean of Women.

UNIVERSITY HEALTH SERVICE

The University attempts to conserve the health of students and has arranged for their medical attention. This is done mainly through the University Health Service, which has headquarters near the campus at 226 South Ingalls Street.

The Health Service is supported by a portion of the student annual fees and provides for practically all of the necessary medical attention to students. A staff of six physicians including one woman, two nurses, and assistants, devote their entire time to the interests of the student health.

Dispensary.—The Dispensary is open five hours daily where students may receive free office medical attention and ordinary medicines. A student may consult any physician of the Health Service Staff at choice. Prescriptions are filled at the Health Service Pharmacy in Room 372 of the Chemistry Building. If a student receives attention of a Health Service physician at his room, a charge of $1.00 for a day call and $2.00 for a night call is made. The corps of physicians in the Medical Schools co-operate with the Health Service whenever students need the attention of specialists. The Health Service is open to all students of the summer session, and for those remaining during the regular vacations. The dental clinics are open to students; the only charge being for material used. Students are advised to have their teeth examined at least once a year.

Hospital Care.—Provision is made at the University hospitals for the care of sick students requiring bed care. If the care of such a student is previously approved by the Health Service, sixty days will be given without charge to the patient. Charge is made for nursing expense in excess of $2.00 per day total, except for self-supporting students unable to assist financially. All surgical operations are free and the Health Service pays the hospital expense of those required for the immediate health of the student.

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Health Preservation.—The efforts to conserve health in the University consider many factors which are recognized as important in preventive medicine. Students are expected to obey the rules and regulations formulated by the University Committee on Sanitation. Failure to comply with these rules and regulations will be investigated, and may lead to discipline.

New students entering the University are advised to bring evidence of having been successfully vaccinated against smallpox, as this has been made a requirement for continued attendance at the University. Cases of infectious disease likely to injure the health of others are excluded from class rooms and from University attendance. In case of threatened smallpox, the University offers free vaccination to all students, but those who neglect vaccination and become infected with the disease are subject to such disposition as the Health Officer of the City may direct. Free immunization against typhoid fever will be given to any student.

A required course of lectures and demonstrations on personal health is given for all first year students in the Colleges of Literature, Science, and the Arts, and of Engineering and Architecture. A course in general hygiene is required of medical students, and is open to students of the entire University. This course extends through one semester, three times a week, and is attended usually by from 300 to 400 students. Special instruction along lines of sex hygiene is given to all students, men and women separately.

All new students are given a complete medical and physical examination under the direction of the Health Service and the departments of Physical Education. Periodic medical examinations are recognized as very important in the preservation of health. Medical students, on account of more frequent exposure to infection, are urged to undergo a physical examination once during each semester of the four years.

Students are urged to select good rooms, with special attention to hygienic conditions. All rooms should be easily ventilated, kept at about 65 degrees temperature, separate for study and sleep, and should have single beds and individual drinking cups. Examination of sputum will be made at the Health Service laboratory and any student who has a cough which continues for a week or longer, should take the sputum there for examination.

The water supply of Ann Arbor is examined both chemically and bacteriologically every week, and when it is under suspicion these examinations are made daily. The student body is informed of the condition of the water by means of bulletins posted about the campus. Since the public water supply was introduced in 1885, no student has been known to contract typhoid fever from this source with but one exception. In 1894, the water became suddenly infected and five cases of typhoid fever resulted, but these were mild and the source of infection was promptly detected and removed. On the slightest suspicion of infection of the water supply, students are

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advised to drink only boiled water until the source of contamination has been found and the water proved to be free from danger.

Specimens of food from students' clubs, fraternity and sorority houses, boarding houses, etc., will be examined free of charge at any time. Most of the milk used in the city at present is pasteurized and hence not likely to cause illness.

ATTENDANCE AND DISCIPLINE

The State of Michigan extends the privileges of the University, with only moderate charges, to all persons of either sex who are qualified for admission. Thus it does not receive patronage, but is itself the patron of those who seek its privileges and its honors. It cannot, however, be the patron of idleness or dissipation. Its crowded classes have no room except for those who assiduously pursue the studies of their choice, and are welling to be governed in their conduct by the rules of propriety.

Students not in their places at the opening of the semester must present written excuses from their parents or guardians for the delay.

Such delinquencies as tardiness, absence, deficiencies, and offences against good order, in the several departments of instruction, are ordinarily dealt with by the Administrative Officers of the school or college in which the student is enrolled. Flagrant cases are reported to the Faculty for adjudication.

Students are suspended or dismissed whenever, in the opinion of the Faculty, they are pursuing a course of conduct seriously detrimental to themselves or the University.

The following is a By-Law of the Board of Regents:—

"Whenever any faculty is satisfied that a student is not fulfilling, or likely to fulfill, the purpose of his residence at the University, or is for any cause an unfit member thereof, the President shall notify his parents or guardian, that they may have an opportunity to withdraw him, and if not withdrawn within a reasonable time, he shall be dismissed."

RELATION OF STUDENTS TO CIVIL AUTHORITIES

Students are temporarily residents of the city, and, like all other residents, are amenable to the laws. If guilty of disorder or crime, they are liable to arrest, fine and imprisonment. A rule of the University Senate provides that if a student is arrested, or is convicted of any offense by the civil authorities, he shall be cited to appear before the Faculty of the school or college in which he is matriculated, and shall be liable to suspension or expulsion.

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STUDENT ORGANIZATIONS AND INTERESTS

While matters of scholarship and general conduct are looked after by the faculties and administrative officers of the different schools and colleges, all other student enterprises and organizations are under the supervision of two general committees,—the Senate Committee on Student Affairs and the Board in Control of Athletics. By the formal action of the Board of Regents, the accounts of all student organizations, are subject to the approval of the Auditor and Comptroller of Student Organizations, and must be presented to him for audit at least once each year, and as often as he shall require.

The Committee on Student Affairs has jurisdiction over the establishment of student organizations and the management of their affairs and the launching of new enterprises and activities including entertainments of various sorts, and determines the eligibility of students to take part in these activities, as well as to hold offices. The authority of this committee is derived from the University Senate and extends to all non-athletic activities and to all students in every school and college of the University. Activities of various types are supervised directly by appropriate sub-committees while the question of eligibility to participate in any non-athletic activity is under the immediate charge of the Sub-Committee on Eligibility. The rules governing eligibility, which have been approved by the Senate, and which apply equally to all schools and colleges of the University, are given below.

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

I.

*Public Activities.**—Public activities include: (1) Participation in any oratorical or debating contest, or any dramatic or musical exhibition; (2) Service on student publications; (3) Holding a Class or University Office; (4) Official connection with any of the so-called college functions, such as the Junior Hop, Women's Banquet, and similar activities. The list is not intended to be exhaustive, but merely to indicate the character and scope of the activities referred to.

II.

Eligibility.—The manager or chairman of every student activity is required to submit to the Chairman of the Committee on Eligibility a complete list of all students who expect to participate and to ascertain their eligibility before proceeding further with the enterprise.

* Participation is to be interpreted as including a specific preparation for any public activity or management thereof.

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No student may take part in any public activity until an official certificate of egilibility is filed with the proper officer in charge of that activity.

III.

Probation.—Students on probation are forbidden to take part in any public activity.

IV.

Warning.—Students on the warned list are forbidden to participate in any public activity.

V.

Conditions and Failures.—Students having outstanding conditions or failures are prohibited from participating in any public activity except by special permission from the Senate Committee on Student Affairs. In general a grade of D will be considered as a condition.

VI.

Special Students.—Special students are prohibited from participating in any public activity except by special permission of the Senate Committee on Student Affairs.

VII.

First Year.—No student shall take part in any public activity during his first year of residence in the University, except by special permission of the Senate Committee on Student Affairs. Such special permission will not be granted during the first semester of residence, but may for proper reasons be granted to students above the rank of freshman, who have satisfactorily completed one full semester's work. This shall not exclude such students without conditions and otherwise in good standing, from participating in the public activities of their class.

VIII.

Physical Disability.—Students excused from gymnasium work on account of physical incapacity are forbidden to take part in any public activity, except by special permission of the Senate Committee on Student Affairs. In order to obtain such permission, a student may in any case be required to present a written recommendation from the University Health Service.

IX.

General.—The Senate Committee on Student Affairs has the right to prohibit a student from participating in any public activity whenever, in the opinion of the Committee, such participation is detrimental to his college work.

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X.

Extra Mural Activities.—Students who are ineligible to participate in public activities within the University are prohibited from taking part in other activities of a similar nature, except by special permission of the Senate Committee on Student Affairs.

XI.

Special Permission.—The special permission to participate in public activities in exception to Rules V, VI, VII, VIII, and X, will be granted by the Senate Committee on Student Affairs only upon the positive recommendation of the Faculty of the school or college to which the student belongs. Petitions for such special permission must in every case be presented before the participation in the activity is begun.

XII.

Discipline.—Cases of violation of these rules will be reported to the Faculty concerned for discipline.

GEORGE P. WILLIAMS EMERITUS PROFESSORSHIP FUND

The University Alumni Association has made contribution for the establishment of the Professor George P. Williams Emeritus Professorship Fund, so named in memory of a former honored professor of Physics in the University.

FELLOWSHIPS, SCHOLARSHIPS, LOAN FUNDS, AND PRIZES*

With the exception of the twenty-five University fellowships and the Phillips Scholarship, none of the scholarships and loan funds are open to students in their first year of residence.

Five University Fellowships with a value of five hundred dollars each have been established by the Board of Regents. These fellows are enrolled as students in the Graduate School. (For further details see Graduate School.) The holders for the year 1920-1921 are: Martha Guernsey, A.B., M.A., Psychology; Arthur Irving Ortenburger, A.B., Zoology; Charles Earl Sando, B.S., M.S., Botany;

* The most of the funds here mentioned are restricted in use to the College of Literature, Science, and the Arts, and the Graduate School, though some of them are also available in other Colleges of the University.

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Lawrence Bunting Sims, B.S.E., Chemistry; Paul Alanson Warren, B.S., Botany.

Ten University Fellowships of three hundred dollars each have also been established on the same terms. For the year 1920-1921, six were finally assigned. The holders are: Charles Carpenter Fries, A.B., M.A., Rhetoric; Karl Willard Guenther, A.B., Sociology; Constance Elizabeth Hopkin, A.B., Education; Yuki Geda Osawa, A.B., M.A., English; Edward G. Punké, B.S., M.A., Sociology; Benjamin David Shapiro, A.B., M.A., History.

Ten State College Fellowships of three hundred dollars each have been established by the Board of Regents on similar terms to the University Fellowships. The candidates are nominated by the faculties of ten colleges in the State of Michigan. For the year 1920-1921, seven were finally assigned. The holders are: Ruth Berdina Blekkink, A.B., History (Hope College); Martin Alfred Larson, A.B., English (Kalamazoo College); Lura Irene Miller, A.B., Chemistry (Alma College); Elmer Llewellyn Overholt, B.S., Economics (Michigan Agricultural College); Esther Annie Pearl, A. B., Mathematics (Albion College); Alice Victoria Peterson, A.B., English (Adrian College); George Shorey Peterson, A.B., Economics (Albion College).

From the Fellowship funds five Scholarships were assigned for the year 1920-1921. The holders are: Adelaide Alice Adams, A.B., Fine Arts; Raymond Roscoe Haffner, A.B., Actuarial Mathematics; Evelyn Hortense Roberts, A.B., Physics; Nelson Vance Russell, A.B., History; Lewis Patrick Waldo, A.B., English.

National Research Council Fellowship.—Dr. Ernest F. Barker, a Fellow of the National Research Council, with cordial consent of the Regents of the University of Michigan, is conducting researches in the physical laboratory of the University on the fine structure of the infra-red absorption bands of gases.

Carl Braun Fellowship.—In December, 1913, Mrs. Elsie L. Braun, of Toledo, Ohio, gave to the University the sum of ten thousand dollars, the proceeds of which are to be used for the establishment and maintenance of a fellowship to be known as the Carl Braun Fellowship. Due to the fact that no award was made in 1918-1919, two awards were made for the year 1920-1921. The holders are Florence Fenwick, B.S. (Chem.), M.S. (Chem.), Chemistry, and Leon Hatchig Leonian, B.S., M.S., Botany.

Buhl Classical Fellowship.—Mrs. Theodore D. Buhl has generously continued the provision made by the late Theodore D. Buhl, of Detroit, for Classical Fellowships for the year 1920-1921.

Emma J. Cole Fellowship in Botany.—In 1910 Miss Emma J. Cole bequeathed to the University the residue of her estate, the proceeds to be used for the establishment of a fellowship in Botany. The holder of the fellowship for 1920-1921 is Lee Bonar, A.B., M.A.

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Angeline Bradford Whittier Fellowships in Botany.—These Fellowships have been established in memory of his mother by Joseph Bradford Whittier, of Saginaw. The principal sum of the endowment is four thousand dollars. One fellowship of the amount of four hundred dollars has been established.

United States Rubber Plantations Fellowship in Botany.—The United States Rubber Plantations, Incorporated, have given the University a fellowship with an annual stipend of twelve hundred dollars for three years. This fellowship is given for a bio-chemical study of the hevea plant. The present holder is Wallace Ellwood Cake, B.S. (Chem.), M.S.

du Pont Fellowship in Chemistry.—The E. I. du Pont de Nemours and Company has given the University the sum of seven hundred and fifty dollars for support of a fellowship in Chemistry for the year 1920-1921. The holder of the fellowship is George Frederick Smith, B.S. (Chem.), M.S. (Chem.).

National Aniline and Chemical Company Fellowship.—The National Aniline and Chemical Company has given the University two fellowships of seven hundred and fifty dollars each for the year 1920-1921. These fellowships are to support studies in Organic Chemistry. The holders are Frederick Franklin Blicke, B.S., and Wesley Minnis, B.S., M.S.

Charles James Hunt Fellowship.—In July, 1900, Mr. Charles James Hunt, of Detroit, a graduate of the University of the Class of 1846, and wife, conveyed by deed, to the Board of Regents, in trust, the title to certain pieces of real estate, subject to Mr. Hunt's life-interest in the income to be derived therefrom, and to the life-interests of other persons named in the deed. After the terminations of these life-interests "one or more fellowships in the University of Michigan" are to be established in accordance with conditions named in the deed of trust and in accompanying documents, and are to be known as the Charles James Hunt Fellowships.

Frederick Stearns and Company Fellowship in Pharmacy.—In order to promote research in pharmacy Frederick Stearns and Company of Detroit has contributed the sum of five hundred dollars for a fellowship. The holder of this fellowship for 1920-1921 is Hans Walter Vahlteich, B.S. (Phar.).

Roy D. Chapin Fellowship in Highway Engineering.—This fellowship is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements. It pays the sum of two hundred and fifty dollars per semester or winter period, with an allowance of fifty dollars for expenses. The holder of the fellowship is Richard Reid Fauver, A.B.

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Roy D. Chapin Fellowship in Highway Transport.—This fellowship is offered to provide for the investigation of an approved subject relative to Highway Transport. It pays the sum of two hundred and fifty dollars per semester or winter period, with an allowance of fifty dollars for expenses. The holder of the fellowship is Herschel C. Smith, A. B., B.C.E.

Detroit Edison Fellowships in Highway Engineering.—These fellowships are offered for the investigation of approved subjects relative to moderate cost country roads. Each fellowship pays the sum of two hundred and fifty dollars per semester or winter period, with an allowance of fifty dollars for expenses. The holders of these fellowships are Emil Robert Olbrich, B.S. in C.E., and Chia Tsun Yeh, B.S. in C.E., M.C.E.

National Steel Fabric Company Fellowship in Highway Engineering.—This fellowship is offered to provide for the investigation of an approved subject relative to Highway Engineering. It pays the sum of two hundred and fifty dollars per semester or winter period, with an allowance of fifty dollars for expenses. The holder of the fellowship is Harold Tuttle Corson, B.S. in C.E.

Acme White Lead and Color Works Fellowship.—The Acme White Lead and Color Works, of Detroit, has since 1911 maintained a fellowship for the study of the scientific principles underlying the successful manufacture of paints and varnishes. This fellowship, temporarily discontinued after the war, was renewed for 1920-1921. The holder is Walter Roland Hickler, B.S.E.

Ric-wiL Company Fellowship.—During the year 1919-1920, the Ric-wiL Company, of Cleveland, established a fellowship for the study of Heat Transmission. This fellowship pays the sum of six hundred dollars. The holder is Charles Arthur Burton, B.S.E.

United States Radiator Company Fellowship.—The United States Radiator Company, of Detroit, has continued its fellowship. The annual stipend is five hundred dollars. The fellowship is established for the investigation of problems connected with the application of different forms of radiators, and other heating devices in heating installations.

Phillips Scholarships.—The late Henry Phillips, Jr., of Philadelphia, Pa., made provision in his will for the establishment and maintenance of six scholarships, to be known as the Phillips Scholarships, in the College of Literature, Science, and the Arts of the University of Michigan. By the terms of the will these scholarships are to be given only to candidates for the degree of Bachelor of Arts, who excel in the Greek and Latin studies required for admission to the University; and they are to be awarded by a committee consist-

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ing of the President of the University, the Dean of the College, the senior professor of Greek, and the senior professor of Latin.

Of the six scholarships contemplated in the bequest, three have been established, with an income of fifty dollars each. They are awarded to students, otherwise properly qualified, under the following conditions:

(a) Candidates for the Phillips Scholarships shall upon their entrance into the University be examined upon four units of Latin, and the committee in charge may award a scholarship to the student obtaining the highest grade; if more than one paper reaches a satisfactory degree of excellency, more than one scholarship may be awarded at the discretion of the committee.

Only the examination in Latin shall be absolutely required; but any student who has had preparation in two units of Greek may elect to be examined upon them as well as upon four units of Latin. If the combined grade of his examinations in Greek and Latin is equal or superior to the grade of a candidate who presents Latin only, he will be given the preference in the awarding of the scholarships.

(b) The successful candidate or candidates shall be required during the year of tenure to pursue each semester one full course of four hours in Greek and one full course of four hours in Latin.

(c) The scholarship held by any successful candidate may, upon application to the Committee, be renewed for a second year, provided that the applicant has attained in his courses in Latin and Greek a grade not less than B and continues the study of both languages during his second year, to the amount of three hours each per semester.

(d) The Committee in charge of the scholarships shall determine, after considering the merits of the individual case, whether it is more expedient to renew the scholarships for a second year or to award new ones.

(e) The provisions of the will regarding the general character of the candidates shall be observed.

Application for admission to this examination must be made to the Dean of the College on or before October 21.

The holders of these scholarships for the year 1920-1921 are Mary Jeanette Loughin, Winifred Isobel Gray Smeaton, and Lucilla Asbury Walker.

Lucinda Hinsdale Stone Memorial Scholarship.—The Michigan State Federation of Women's Clubs has presented to the University the sum of three thousand dollars, as a portion of a fund to be known as the Lucinda Hinsdale Stone Supplementary Loan Scholarship Fund, the income of which is to be administered by the President of the University, the Dean of Women, and a third person of their appointment (who shall be a woman), for the benefit of women who are students in the University. On an average three young women each year have been assisted by the income from this fund.

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Detroit High School Scholarships.—The alumni of the Detroit High School have established several scholarships open to graduates of that school. The first steps toward raising a fund for this purpose were taken in 1891; and a corporation has since been formed under the title of the Detroit High School Scholarship Fund Association.* From four to six students at a time usually enjoy the benefit of the fund. Several of the beneficiaries have received degrees at the University. One of the scholarships is known as the Mary C. Leete Memorial Scholarship, in memory of a teacher who died in 1894.

In July, 1915, a further sum of $1,300 was given for the establishment of a loan fund open to a graduate of the Detroit Central High School, and to be known as the Charles Francis Adams Memorial Fund, in memory of a teacher who died in 1914.

Saginaw High School Scholarships.—Four Scholarships, with an annual income of two hundred and fifty dollars each, established by the Honorable Arthur Hill, of Saginaw, W. S., and known as the John Moore, the Wells-Stone, the Alonzo R. Bingham, and the Otto Roeser scholarships, are open to graduates of the Saginaw, W. S., High School.

The Saginaw, E. S., High School offers several scholarships of varying amounts to deserving graduates of that school. One of these is known as the Heavenrich Brothers & Co.'s Scholarships, and is provided by the mercantile firm of that name. Another, designated as the High School Scholarship, is cared for largely by the High School Lyceum. A third is known as the A. R. Loveland Scholarship. The graduating class of 1900 also made provision for a scholarship to be available every sixth year. These scholarships are all administered as loan funds.

Grand Rapids High School Scholarships.—The High School Scholarship Association of Grand Rapids is a body incorporated under the State Law, for the purpose of assisting graduates of the Grand Rapids High School to secure a college education in the College of Literature, Science, and the Arts, or the Colleges of Engineering and Architecture, of the University of Michigan.

Perry Scholarship Fund.—The Alumni Association of the Ann Arbor High School, in 1898, established a fund, in memory of Walter Scott Perry, graduate of the University in the Class of 1861, and for twenty-seven years Superintendent of the Ann Arbor schools.

* The State Legislature in 1893 passed an act providing "that five or more persons of full age residing in the State of Michigan may associate and incorporate themselves together for the purpose of establishing scholarships in the University of Michigan, for the benefit of graduates of the high schools of the State." A corporation organized in accordance with the provisions of this act "shall under the general management of not less than five, nor more than fifteen trustees," and "shall, in law and equity, be capable of taking and receiving real and personal estate . . . not exceeding one hundred thousand dollars in the aggregate, for the purpose of its incorporation."

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The purpose of the fund is to assist graduates of the school in procuring an education in the College of Literature, Science, and the Arts of the University of Michigan. It is administered as a Loan Fund,* repayments to be made by beneficiaries under regulations prescribed by the Board of Directors of the High School Alumni Association.

Saginaw Valley Alumnae Association Scholarship Fund.—The Saginaw Valley Alumnæ Association in 1904 established a fund for the aid of undergraduate women in the College of Literature, Science, and the Arts. The fund is administered as a Loan Fund under the direction of the Dean of Women and representative Alumnæ.

Seth Harrison Scholarship Fund.—The Seth Harrison Scholarship Fund was established in memory of her father, by Mrs. Clara Harrison Stranahan, of Brooklyn, N. Y. The principal of the fund was originally twenty-five thousand dollars, but this has been increased by additions from unexpected income. The income is to be used, on conditions specified in the covenant between Mrs. Stranahan and the Board of Regents, for the benefit of descendants of Seth Harrison who may be pursuing studies in the College of Literature, Science, and the Arts of the University of Michigan, whenever applicants properly qualified present themselves. Provision is made, however, for applying the income of the fund to scholarships for other persons, "if at any time there shall be a period of seven years during which there are no qualified applicants," descendants of Seth Harrison.

Margaret Smith Hunt Scholarships, James B. Hunt Scholarship, and Charles James Hunt Scholarship.—In July, 1900, Mrs. Margaret Elsie Hunt, of Detroit, a student in the University in the year 1878-1879, conveyed by deed to the Board of Regents, in trust, the title to certain pieces of real estate, subject to Mrs. Hunt's life interest in the income to be derived therefrom. After the termination of this life-interest, "one or more scholarships in the undergraduate course of studies in the Department of Literature, Science, and the Arts," are to be established in accordance with conditions named in the deed of trust and in accompanying documents, and are to be known as the Margaret Smith Hunt Scholarships.

In February, 1902, Mr. and Mrs. Hunt conveyed by deed to the

* In 1899 an act was passed by the State Legislature containing the following provisions: "Any five or more persons of full age residing in the State of Michigan may associate and incorporate themselves together for the purpose of establishing loan funds for the benefit of school scholars and students of this State, to assist them to attend the University of Michigan" (and other State educational institutions). "All the funds received by any corporation organized under this act shall be used, after paying necessary expenses, for the exclusive purpose or purposes set forth in the articles of association. . . . Such corporation shall in equity and law be capable of taking and receiving real and personal estate . . . not exceeding twenty-five thousand dollars, in the aggregate, for the purpose of its incorporation."

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Board of Regents, in trust, the title to a certain other tract of land, subject to Mrs. Hunt's life-interest in the income to be derived therefrom and to certain other life-interests, and conditions named in the deed. After the termination of these life-interests, and in accordance with conditions named in the deed of trust, and in accompanying documents, a portion of the income derived from the trust is to be devoted to the maintenance of the James B. Hunt Scholarship, so named in memory of the father of Charles James Hunt; a second portion to the maintenance of a scholarship, to be known as the Charles James Hunt Scholarship; and the remainder to the maintenance of Margaret Smith Hunt Scholarships in addition to those previously provided for.

W. W. Wedemeyer Scholarship.—The Class of 1894 established a fund, the income of which is "to be used as a loan fund for the benefit of needy and worthy undergraduates in the Literary Department," on condition that the Board of Regents "shall require of each student or students as may receive the benefit of such fund a promise to repay to said Board the sum loaned on such terms as shall seem to said Board to be reasonable; it being the intention of the donors of said fund that the same shall be kept intact, as far as possible."

In February, 1913, at the request of the donors the fund was named the W. W. Wedemeyer Scholarship Fund, in memory of the late Hon. W. W. Wedemeyer, an honored member of the Class of 1894.

Scholarship of the Class of 1897.—The Class of 1897 has established a fund, a portion of which is available as a loan fund.

Scholarship of the Class of 1898.—The Class of 1898 has established a scholarship fund, the proceeds of which are not yet available.

Scholarship of the Law Class of 1899.—A small sum, contributed by members of the Law Class of 1899, is available as a loan fund.

Students' Lecture Association Fund.—Under the condition of the gift made to the Board of Regents by the Students' Lecture Association, a small fund is available for loan to students in any school or college of the University. All loans are to be made through a committee consisting of the President of the University, the Dean of the College of Literature, Science, and the Arts, the Dean of the Medical School, and the Dean of the Law School, and they are to be secured by note payable one or more years after the borrower has completed his university course.

Newton Van Der Veer Loan Fund.—In January, 1900, the Regents accepted from Mrs. George Wagner a sum of money as the nucleus of a fund to be known, in memory of her father, as the Newton Van Der Veer Loan Fund; and to be used in loans "to

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needy students in such amounts and under such conditions as the executive head of the University may deem proper and wise."

Detroit Collegiate Alumnae Fund.—In March of 1907 the Detroit Branch of Collegiate Alumnæ established a fund for the aid of undergraduate women in the University. This fund is administered as a loan fund under the direction of the Dean of Women and representative Detroit Alumnæ.

Ann Arbor Collegiate Alumnae Fund.—The Ann Arbor Branch of the Association of Collegiate Alumnæ has established a fund for the aid of undergraduate women in the College of Literature, Science, and the Arts. This fund is administered as a loan fund under the direction of the chairman of the scholarship committee, the president of the Ann Arbor branch, and the Dean of Women.

Webster Loan Fund.—In February, 1909, the Regents accepted from Mr. John R. Webster and his son, Mr. John P. Webster, a sum of money for the foundation of a scholarship. It is administered as a loan fund.

Alice Freeman Palmer Scholarship.—The Alumnæ of the University are trying to raise five thousand dollars to endow this scholarship, and a considerable sum has already been paid in to the University Treasurer.

Joseph A. Bartholomew Scholarship.—The late Joseph A. Bartholomew bequeathed to the University of Michigan property on the income of which is to be established a scholarship of the value of five hundred dollars annually.

Anna M. Chandler Scholarship Fund.—The Alumni of tne Marquette, Michigan, High School have given to the University the sum of one thousand dollars to be known as the Anna M. Chandler Loan Fund, in honor of Miss Anna M. Chandler, A.B., 1874, for thirteen years superintendent of schools of Marquette. The money is administered as a loan fund, preference being given to graduates of the Marquette High School.

The Henry Strong Scholarships.—The heirs of the late Henry Strong, of Lake Geneva, Wis., have established in memory of their father, three scholarships of the value of two hundred fifty dollars each.

The James L. Babcock Scholarship Fund.—The late James L. Babcock, of Ann Arbor, Michigan, bequeathed to the University the sum of five thousand dollars in trust, to be loaned out and kept at interest, said interest to be used annually and perpetually to help educate a worthy young man or worthy young woman as the case may be. The income, known as the James L. Babcock Scholarship Fund, is administered by the President and Secretary of the Univer-

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sity and the Professor of Music in the College of Literature, Science, and the Arts; and is awarded each year to a student who is especially interested in music and who desires to elect work in the department of Music. The student selected must, in addition to being especially interested in the subject of music, have attained at least an average standing in other subjects at the University, and if, during any year, no condidate meeting the conditions can be found, the income from the fund is added to the principal. The holder of this fellowship for 1920-1921 is Bertrand Harris Bronson.

Marsh Scholarships.—In 1916 the late Elia M. Walker bequeathed to the University the sum of ten thousand dollars, the income of which is to be used for the establishment of two or more scholarships named in honor of the donor's parents, John Pitt Marsh and Fanny Ransom Marsh.

William James Olcott Scholarships.—In June, 1916, Mr. William J. Olcott, of Duluth, Minnesota, gave to the University the sum of five thousand dollars for the establishment of a scholarship open to students in the College of Engineering. The amounts awarded, when repaid, shall accumulate towards the foundation of further scholarships.

McGowan Loan Fund.—In November, 1915, Mrs. Josephine P. McGowan gave to the University the sum of five hundred dollars for the establishment of a loan fund for needy students in the College of Literature, Science, and the Arts, in memory of her husband, the late Hon. Jonas H. McGowan, Regent of the University from 1870 to 1877.

John Frank Dodge Loan Fund.—In November, 1915, Mr. John F. Dodge, of Detroit, gave to the University the sum of $10,000 for the establishment of a loan fund for worthy juniors and seniors in the College of Engineering.

F. M. Hamilton Loan Fund.—In December, 1915, the heirs of the late Francis M. Hamilton, A.B., 1869, of Ann Arbor, gave to the University the sum of one thousand dollars for the establishment of a loan fund.

Eliza Mosher Loan Fund.—In April, 1916, the New York Alumnæ Association gave to the University the sum of one thousand dollars to establish a loan fund for women of the University in honor of Dr. Eliza Mosher, the first Dean of Women.

Michigan Daughters of the American Revolution Loan Fund.—In April, 1916, the Daughters of the American Revolution of the State of Michigan gave to the University money for the establishment of a loan fund for senior women in the College of Literature, Science, and the Arts.

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Newell and Nancy Eddy Avery Memorial Loan Scholarship Fund.—A donor who prefers to remain unknown has given to the University the sum of five thousand dollars, the income of which is to be used to establish a loan fund for junior and senior women in the College of Literature, Science, and the Arts.

Florence Huson Scholarship.—In 1916 the late Dr. Florence Huson bequeathed to the University the sum of six thousand dollars for the establishment of a scholarship for women students, to be administered as a loan fund.

Alice Hosmer Preble Scholarship Loan Fund.—Friends of Dr. Robert B. Preble, of the Class of 1889, and Mrs. Robert B. Preble, of the Class of 1888, have given to the University the sum of $2,500 for the establishment of a scholarship loan for women students to be known as the Alice Hosmer Preble Scholarship Loan Fund, in memory of and to continue the work of Mrs. Preble.

The George C. Caron Scholarship Fund.—In January. 1917, Dr. and Mrs. George C. Caron, of Detroit, gave to the University the sum of $2,000 for the establishment of a scholarship in memory of their son, the late George C. Caron, Jr., of the Class of 1914. The beneficiaries are to be seniors giving special attention to journalism or seniors in the Homœopathic Medical School. The scholarship is administered as a loan fund.

The Jane Turner Memorial Gift Fund.—In January, 1917, Miss Mary E. Turner, of Detroit, gave to the University the sum of $3,500 to be used as a loan fund for women students in the University. This fund is named in memory of her sister, the late Jane Owen Turner, a student during the year 1896-1897.

Jane Turner Loan Fund.—In April, 1917, Miss Mary E. Turner gave to the University the additional sum of fifteen hundred dollars to be used as a loan fund.

Richard Nelville Hall Memorial Fund.—In March, 1917, the parents and friends of Richard Nelville Hall, of Ann Arbor, who lost his life while engaged in the ambulance service in connection with the French Army in Alsace, December 24, 1915, gave to the University the sum of two thousand dollars for the establishment of a loan fund in his memory.

Barbour Scholarships.—In June, 1917, the Hon. Levi L. Barbour, of Detroit, gave to the University the sum of $100,000 for the establishment of scholarships for women students coming from oriental countries. In January, 1920, Mr. Barbour made a further gift of $250,000 to this fund. The holders of these scholarships for the year 1920-1921 are Probhabati Das Gupta, Me Tsung Dong, Kita Fukui, Ai Lan Giang, Asha Latika Holdar, Ai D. Kiuchi, Gien Tsiu

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Liu, Matsu Matsumoto, Sugi Mibai, Zok Tsung Tsao, and Helen Lee Wong.

Educational Loan Fund.—In June, 1917, an alumnus gave to the University the sum of one hundred dollars to be used as a loan fund for students taking work in education.

Paul Wheeler Warriner Scholarship in Engineering.—In June, 1920, Eugene C. Warriner, A.B., 1891, A.M., 1912, and his wife, Ellen Wheeler Warriner, A.B., 1891, gave to the University the sum of three hundred dollars as a loan scholarship to be known as the Paul Wheeler Warriner Scholarship in Engineering, in memory of their son, a member of the Class of 1920, who died in Ann Arbor, March 5, 1917.

George H. Benzenberg Trust Fund.—In September, 1920, George Henry Benzenberg, C.E., 1867, gave to the University the sum of $20,000 in Liberty Bonds, the income from which is to be used as a loan fund for worthy and needy students in the College of Engineering.

Good Government Club Prize.—The income of the sum, originally five hundred dollars, which has since grown to twelve hundred dollars, presented to the Board of Regents by the Good Government Club of the University, is available, under the conditions of the gift, in the form of books to be awarded as a prize to that student of the graduating class in the College of Literature, Science, and the Arts who has done the most distinguished work as an undergraduate in the field of political science.

Michigan Menorah Society Prize.—Mr. Julius Rosenwald, of Chicago, Illinois, has given to the University of Michigan an annual sum of one hundred dollars, to be awarded as a prize for an essay by an undergraduate of the University of Michigan, on a topic dealing with the literature, the history, and the achievements of the Jewish people. He has offered this prize with a view of stimulating a general and intelligent interest in a field which promises so well for the disclosing of one of the sources of our modern civilization, the Hebraic, the other being the Hellenistic. The prize is known as the "Michigan Menorah Society Prize," a society organized at the University for the study of Hebraic culture and ideals, which Mr. Rosenwald desires to encourage.

The award is made by a committee of three, appointed by the President of the University, one member, however, to be nominated by the Michigan Menorah Society.

The award is given only for essays showing sufficient merit. In case the judges should conclude that none of the essays presented deserves recognition, the year succeeding two prizes will be offered, each in the sum of one hundred dollars. If two essays should be of equal merit, the judges may divide the prize equally, awarding to each essay the sum of fifty dollars.

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SUPPLEMENT TO UNIVERSITY BULLETIN

NEW SERIES, VOL. XXII, NO. 47 MAY 21, 1921

Since the body of the catalogue went to press, the following very important changes in fees have been made by action of the Board of Regents:

FEES

Matriculation Fee

(Same as before)

	Michigan Students		Non-Residents	
	Men	Women	Men	Women
All Schools and Colleges	$ 10	$ 10	$ 25	$ 25

Annual Fee

College of Literature, Science, and the Arts	$ 80	$ 76	$105	$101
Colleges of Engineering and Architecture	95	91	120	116
Medical School	140	136	200	196
Law School	105	101	125	121
*College of Pharmacy	95	91	120	116
Homœopathic Medical School	140	136	200	196
College of Dental Surgery	140	136	200	196
Graduate School	80	76	105	101

These Annual Fees include the laboratory fees charged separately heretofore. A cash deposit is required to cover the cost of material used and unusual breakage in the laboratories of Chemistry, Hygiene, and Bacteriology.

Summer Session, 1921

	All Students
Colleges of Literature, Science, and the Arts, of Engineering and Architecture, and of Pharmacy, and Graduate School.	$ 30.00
Medical School	30.00
Law School	37.50
Embalming and Sanitary Science	75.00

DATES

For the year 1921-1922 the first semester begins September 27, 1921. Registration takes place the preceding week.

THE UNIVERSITY BULLETIN IS REGULARLY ISSUED BY THE UNIVERSITY OF MICHIGAN ON THE 1ST, 10TH, AND 20TH OF EACH MONTHE

ENTERED AS SECOND-CLASS MATTER AT THE POSTOFFICE AT ANN ARBOR, MICHIGAN.

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STUDENT SELF HELP

While the University does not undertake to furnish manual labor or other opportunities for work to students, yet a considerable number find opportunities in the city for remunerative labor, to assist in defraying their expenses. A word of caution is needed, however. Students should not undertake so much outside work as to interfere with their studies or injure their health. They should arrange their recitation schedules so as to leave uninterrupted periods for working.

The Students' Christian Association maintains free of charge employment bureaus for men, whereby many students are assisted in finding positions to earn money. All women students desiring employment should apply to the Dean of Women before settling their class schedules.

FEES AND EXPENSES

In view of the fact that no variation can be made from the rule that all fees are due and payable in advance for the entire year, no prospective student should come to Ann Arbor for registration without a sum sufficient to cover all his fees for the entire year. Students coming from foreign countries should particularly note this fact.

ALL FEES MUST BE PAID IN ADVANCE OR AT THE TIME OF REGISTRATION.—A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due. The matriculation and annual fees must be paid in full at the time of registration. The laboratory fees and other special fees are payable at or before the time of enrollment in the class. The graduation fee and the teacher's diploma fee must be paid before the candidate is recommended by the faculty. Those graduating or taking a teacher's diploma on Commencement Day must pay the required fee on or before a fixed date preceding Commencement Day, which date will be posted in due season by the Secretary. Holders of fellowships or of scholarships are required to pay the matriculation fee (if not already paid), the annual fees, graduation fee, laboratory expenses, and other similar charges, the same as the other students of the school or college in which their work lies.

RESIDENCE.—*The burden of registering under proper residence is placed upon the student;* and it is the duty of each student at registration, if there be any possible question of his right to legal residence in Michigan, *under the rules of the Regents,* to raise the question with the registration officer and have such question passed upon and settled by the proper officers of the University, previous to regis-

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tration. Residence in Michigan cannot be gained while one is enrolled as a student at the University. Any student who registers improperly under this rule shall, when discovered, be required to pay not only the proper non-resident fees but shall be assessed as an addition to the annual fee for that year, the sum of $10. Students of foreign birth are required, on first registering in the University, to furnish legal evidence of the citizenship of themselves or, if minors, of their legal guardians.

MATRICULATION FEE.—Every student, before entering a school or college of the University, is required to pay a matriculation fee. This fee, which, for citizens of the United States, legally resident in Michigan, or their wards, is *ten dollars,* and for others, *twenty-five dollars,* is paid but once, and entitles the student to the privileges of permanent membership in the University. Aliens who have their first naturalization papers will be regarded as citizens of the United States.

ANNUAL FEES.—(See also "Fee for Second Semester." In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses, and, in some schools or colleges, a small additional fee for special purposes. These fees are paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. The annual fees in the several schools and colleges of the University are as stated below. By "Michigan students" is meant those who are citizens of the United States, legally resident in Michigan, or their wards.

College of Literature, Science, and the Arts: For Michigan students, *eighty dollars* for men, *seventy-six dollars* for women; for all others, *one hundred five dollars* for men, *one hundred one dollars* for women. Students in the College who are pursuing a combined curriculum, and, in consequence, are registered at the same time in one of the professional Schools are required to pay the annual fee due from students in such professional Schools instead of the annual fee of the College of Literature, Science, and the Arts.

Colleges of Engineering and Architecture: For Michigan students *ninety-five dollars* for men, *ninety-one dollars* for women; for all others, *one hundred twenty dollars* for men, *one hundred sixteen dollars* for women.

Medical School, (including laboratory fees): For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *one hundred sixty-five dollars* for men, *one hundred sixty-one dollars* for women. The fee required for graduate students who pursue special advanced laboratory courses in this School is, in addition to the ordinary laboratory expenses, ten dollars for each course taken.

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Law School: For Michigan students, *one hundred five dollars* for men, *one hundred one dollars* for women; for all others, *one hundred twenty-five dollars* for men, *one hundred twenty-one dollars* for women.

College of Pharmacy: For Michigan students, *ninety-five dollars* for men, *ninety-one dollars* for women; for all others, *one hundred twenty dollars* for men, *one hundred sixteen dollars* for women.

Homœopathic Medical School, (including laboratory fees): For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *one hundred sixty-five dollars* for men, *one hundred sixty-one dollars* for women.

College of Dental Surgery: For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *one hundred seventy-five dollars* for men, *one hundred seventy-one dollars* for women. A further charge of *ten dollars* a year is made to cover the cost of certain special supplies provided by the University.

Graduate School: For Michigan students, *eighty dollars* for men, *seventy-six dollars* for women; for all others, *one hundred five dollars* for men, *one hundred one dollars* for women. The fee required from graduate students who are granted the privilege of pursuing studies for an advanced degree *in absentia* is ten dollars for each year of registration.

Fee for Part Time Students: Persons actively engaged in teaching in public, parochial, or private schools, who are regularly admitted as students in the College of Literature, Science, and the Arts, or the Graduate School, may elect not more than five hours a week, upon the payment of a fee of *ten dollars* in lieu of the regular annual fee. Such students must pay the matriculation fee, the same as other students, and are subject to the same rules as are all other students regarding the time of registration, etc. This privilege of enrolling at an annual fee of ten dollars is extended to students in the Graduate School who have completed their course work for the doctor's degree, but have not completed the thesis requirement, and to practicing engineers and physicians.

Second Semester Fee.—A student who registers at the beginning of the second semester is required to pay 60% of the prescribed annual fee (see refund of fees (g) below).

LATE REGISTRATION.—Registration (i. e. enrollment, payment of fees, and classification) must be entirely completed before the first day of the semester. Students failing to complete their registration before the first day of each semester are required to pay a late registration fee of five dollars.

Refund of Fees.—(a) No student will be entitled to a refund except after surrender to the Secretary of the University of the

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student's original receipt from the Treasurer of the University and the surrender of all tickets issued to such student for athletic events not yet having occurred. Students should scrupulously preserve all receipts.

(b) No refund will be made to any student expelled, suspended, or requested to withdraw on account of conduct or poor scholarship.

(c) No refund or reduction of matriculation fee is made except in case of those withdrawing within the first two weeks after registration.

(d) Any student who withdraws voluntarily and in good standing not more than two weeks after his registration shall be entitled to a refund of his entire annual fee, together with the matriculation fee.

(e) A student who withdraws thus more than two weeks and less than eight weeks after his registration is entitled to a refund of one-half his annual fee.

(f) A student who withdraws thus more than eight weeks after the beginning and not later than the end of the semester of registration is entitled to a refund of 40% of his annual fee.

(g) The 40% refunded to students enrolling at the beginning of the second semester (see "Second Semester Fee" above) shall be included in determining any further refund to withdrawing students under (d) and (e) above.

(h) A student who transfers at the beginning of the second semester from one school or college to another in which the annual fee is higher shall be required to pay an additional amount sufficient to bring the total fee to that in the latter school or college.

FEE FOR SPECIAL ENTRANCE EXAMINATIONS.—An applicant for admission to any college of the University who presents himself for the entrance examinations at a date later than that announced in the University Catalogue is required to pay the University Treasurer a fee of *five dollars* before he can receive permission to take the examinations.

LABORATORY EXPENSES.—Students who pursue laboratory courses in chemistry, are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different for the different courses, ranging from *five to twenty dollars*. The laboratory expenses of students vary with their prudence and economy. In the chemical laboratory the average expense for each course is about *four dollars and fifty cents* per credit hour.

The laboratory deposit must in all cases be paid to the Treasurer of the University before the student may enroll in the class.

GYMNASIUM EXPENSES.—A charge of *two dollars* a year is made for the rental of a locker in Waterman gymnasium, *one dollar* for a locker in Barbour gymnasium.

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GRADUATION FEE.—The fee for graduation is *ten dollars*. The by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for graduation.

TEACHER'S DIPLOMA.—The fee for the Teachers' Diploma is *two dollars*, which must be paid in advance of recommendation.

SPECIAL CERTIFICATE IN BUSINESS ADMINISTRATION.—The fee for the Special Certificate in Business Administration is *two dollars*, which must be paid in advance of recommendation.

FEES FOR SUMMER SESSION.—(a) In the Colleges in which the session is eight weeks in length a uniform fee of *thirty dollars* for the session is required of all students. (b) In the Medical School, which is six weeks in length, the fee is *thirty dollars* for laboratory and demonstration courses, and *thirty-five dollars* for clinical courses. (c) In the Law School a uniform fee of *thirty-seven and one-half dollars* is required.

Fees stated include laboratory fees, excepting that a cash deposit is required to cover the cost of material used and unusual breakage in the laboratories of Chemistry, Hygiene, and Bacteriology. All students are entitled to the privileges of the University Health Service.

OTHER EXPENSES.—Expenses for board and room vary considerably with the taste and means of the individual student, and may be regarded as approximating such expenses in cities of similar situation. The annual expenses of students, including clothing and incidentals, are on the average, somewhat over six hundred dollars. The University does not undertake to furnish manual labor to students; yet a number find opportunities in the city for remunerative labor. For further statement concerning student employment see page 115.

There are no dormitories for men, and no commons connected with the University. The Michigan Union maintains bureaus of information regarding rooms and board, and provides other special facilities for new men students. Four residence halls for women accommodate about three hundred women. There are also a considerable number of approved houses for women conducted as cottage dormitories. Women students should, in advance of their arrival, communicate with the Dean of Women regarding lodgings. (See page 97.)

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College of Literature, Science, and the Arts

The College of Literature, Science, and the Arts owes its name to a provision in the legislative act under which the University was organized in the year 1837, the nomenclature Department being changed to College by the Board of Regents in January, 1915. Its aim is to cover the broad field of general university study of the ancient and modern languages and literatures, or history, philosophy, mathematics, science, and the liberal arts, as distinguished from the more special work of the professional schools in engineering, medicine, law, pharmacy, and dentistry; and it offers a large number of courses of instruction, from which the student is allowed to choose such as he is qualified to pursue.

The Graduate School formerly maintained in connection with this College has been reorganized to include graduate work throughout the University, and is under the direction of a Dean and an Executive Board.

The academic year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922.

REQUIREMENTS FOR ADMISSION†

ADMISSION OF CANDIDATES FOR A DEGREE

[For admission to advanced standing, see page 136.]

[For admission of students not candidates for a degree, see page 137.]

Admission to this College is gained only by examination or by certificate. Applicants for admission must be at least sixteen years

† It is rarely necessary to come to Ann Arbor for a personal interview. Arrangements for admission can be made by mail, provided the communications are complete and definite and the credentials are official. Applicants for admission on advanced standing from other colleges or normal schools should address the Dean. Those seeking admission as freshmen should address the Registrar.

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of age, and must have completed the requirements for admission as here described. Fifteen units are required for admission, a unit meaning the equivalent of five recitations a week in one branch of study for one year, amounting in the aggregate to not less than one hundred twenty sixty-minute hours in the clear. Two or three hours of laboratory, drawing, or shop-work will be counted as equivalent to one of recitation.

ADMISSION ON EXAMINATION

The fifteen units presented for admission on examination must all be chosen from Group I. They must embrace two subjects of three units each, and must include three units of English Composition and Literature, two units of a Foreign Language, one unit of Algebra, and one of Geometry, and one unit of one of the sciences, Physics, Chemistry, Botany, or Zoology.

School credits are not accepted in lieu of the examination given by this University. Those earned by taking the examinations of the College Entrance Examination Board and of the Regents of the State of New York are so accepted as far as they go.

ADMISSION ON CERTIFICATE

Only those applicants are admitted on certificate who are officially recommended graduates of high schools accredited to this University and have completed a full four-year curriculum in a standard high school, covering at least fifteen units.

It is expected that the principal will recommend not all graduates, but only those whose ability, application, and scholarship are so clearly superior that the school is willing to stand sponsor for their success at the University.

The principals of approved schools are urged to send directly to the Registrar, immediately upon the close of the school year, the recommendation of each graduate intending to enter this College at the beginning of the ensuing year. If, on inspection, the recommendation is found satisfactory, the Registrar will forward to the applicant a certificate entitling him to admission without examination. The address of the applicant and all other data asked for are to be entered on this blank.

No applicant will be admitted who presents less than fifteen units.

There are two plans for admission on certificate:

Plan A.—For the graduates of all the accredited schools except those entitled to the optional privileges of Plan B.

Plan B.—For graduates of the schools on the approved list of the North Central Association of Colleges and Secondary Schools, and other especially approved schools.

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Plan A. The fifteen units presented for admission on certificate, must include twelve units from Group I and three additional units from either Group I or Group II. The fifteen units must include the following:

English	3 units
Foreign Language, any one	2 units
Greek, Latin, French, Spanish, or German	
Algebra	1 unit
Geometry	1 unit
Science, any one	1 unit
Physics, Chemistry, Zoology, or Botany.	

Plan B. Graduates of schools on the approved list of the North Central Association of Colleges and Secondary Schools will be admitted upon the presentation of a recommendation covering not less than fifteen units, of which at least twelve must be from Group I. The other three units may be from either Group I or Group II. Admission on this basis of recommendation may be granted also to the graduates of other especially approved schools.

SUBJECTS ACCEPTED FOR ADMISSION

The subjects from which choice may be made, and the number of units which will be accepted in each subject are as follows:

Group I*

(Twelve units must be chosen from this group.)

English Composition, 3 units.
English Literature, 1 unit.
Greek, 2 or 3 units.
Latin, 2, 3, or 4 units.
French, 2, 3, or 4 units.
German, 2, 3, or 4 units.
Spanish, 2, 3, or 4 units.
History, 1, 2, or 3 units.
Algebra, 1, 1½, or 2 units.
Geometry, 1 or 1½ units.
Trigonometry, ½ unit.
Physics, 1 unit.
Chemistry, 1 unit.
Zoology, ½ or 1 unit.
Botany, ½ or 1 unit.
Introductory Science, ½ or 1 unit.
Physiology, ½ unit.
Geography and Geology, ½, 1, or 1½ units.

* A single unit of a foreign language may be counted among the twelve from Group I upon the satisfactory completion in the University of a second course in the same language.

In order that a half unit in science may be accepted it must be supplemented by a second half unit in science.

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Group II

(Three units may be chosen from this group.)

Group II comprises any subjects not listed in Group I which are counted toward graduation by the accredited high school from which the applicant receives his diploma.

Subjects from Group II will not be accepted for admission on examination.

Pre-Medical and Pre-Dental Requirements

Applicants for admission who intend later to study Medicine or Dentistry should offer two units of Latin and one unit each of Physics and Chemistry. They are also strongly advised to present French or German, Botany, and Zoölogy. Those who enter without these subjects will ordinarily need to attend one or more Summer Sessions in addition to the regular term of residence prescribed.

Six-Year High Schools

In June, 1914, the following resolutions relative to six-year high schools and the admission of graduates from such schools were adopted by the Faculty of the College and approved by the Board of Regents. Until the requirements shall have been more explicitly formulated, they will be administered in the spirit of these resolutions.

Resolved: 1. That school authorities be encouraged to incorporate the seventh and eighth grades of the elementary schools as an integral part of the high school, forming a six-year system;

2. That school authorities be recommended to organize the six-year high school system into a Junior high school of three years and a Senior high school of three years as soon as local conditions will admit;

3. That graduates of six-year high school courses be required to gain during the last three years at least eight of the fifteen units required for admission, two of which units shall be obtained during the senior year;

4. That graduates of six-year high school courses be permitted to apply for university credit *on examination*.

SCOPE OF PREPARATORY WORK

The following descriptive outline indicates the amount of preparation expected in each of the subjects named:

ENGLISH LANGUAGE AND COMPOSITION.—The three units in English language and composition should cover the following subjects:

Composition.—As preparation for this requirement, it is expected that the student will have prepared, under the direction of a compe-

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tent instructor, one or more written exercises each week for at least three years. A sufficient number of these exercises should be corrected by the teacher and revised by the student to secure the desired accuracy. It is highly desirable that longer and more carefully planned papers should be a feature of the fourth year. The subjects upon which the student writes should not be drawn exclusively from literature; a considerable portion of them should be so distributed as to give proper training in the various types of discourse, namely, description, narrative, argument, and exposition.

The student's credentials should show the amount and character of the work in composition.

Rhetoric.—The student should be grounded in the essentials of rhetoric, but those principles should receive emphasis which are most likely to be of service to him in his practice in writing, such as the principles of sentential structure, paragraphing, and the outlining of the essay. The correction of stock specimens of bad English is not recommended, and will form no part of the entrance requirement.

Grammar.—The applicant should be prepared to state intelligently the essential principles of grammar and to explain the syntactical structure of any sentence encountered in his reading.

Reading of Literature.—The reading, in amount and character, should be such as is recommended in the Bulletin of the National Bureau of Education, 1917, No. 2,* though books of equal merit covering a similar range of literary types will be accepted as equivalents.

It is recommended that in connection with the reading, the memorizing of notable passages, in both prose and poetry, should form a regular exercise throughout the whole preparatory period. This is all-important for the development of a correct taste in language and literature.

Applicants who present themselves for examination will be asked to write two essays of not less than two hundred words each, one upon a subject drawn from his reading, and the other upon a subjest drawn from experience or observation. The purpose of this second paper will be to enable the candidate to show that he has read, understood, and appreciated a sufficient amount of literature; but he may also be asked questions which he can answer only by applying what he has learned to passages of literature which he has not seen before. The language of these essays must be grammatical and clear. The spelling, punctuation, and capitalizing must be correct. The applicant must show ability to discriminate in the

* The Bulletin is entitled "Reorganization of English in Secondary Schools." It contains a full statement of the scope of the work in preparatory English, together with graded lists of books and a useful bibliography. Courses may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at twenty cents per copy.

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use of words and to construct well-organized sentences and paragraphs. A topical outline should accompany each essay. The applicant should also be prepared to answer questions upon the fundamental principles of grammar and rhetoric.

HISTORY OF ENGLISH LITERATURE.—The applicant who offers four units in English composition and literature should have pursued the study throughout the four years of the high school course. In addition to the foregoing requirement his preparation should include a systematic study of the outlines of English literary history. Due emphasis should be laid upon the division of the subject into periods; and the leading characteristics of each period should be studied and, so far as possible, illustrated by the reading of representative authors. Any of the current manuals of English literature may serve as the basis of this part of the work, which should occupy the third or fourth year of the course. The historical study should, however, be associated as closely as possible with the reading of classics.

GREEK.—Applicants who offer two units in Greek should have completed a suitable beginner's book, or else should have mastered portions chosen by their teacher from a standard grammar. These grammar selections must be sufficient to cover all the ordinary inflections and the common principles of syntax.

In reading, a minimum equivalent to three books of Xenophon's *Anabasis* and two books of Homer is required; but the teacher may select other portions of Attic prose in place of the *Anabasis,* and the reading in Homer may be made up of selections from various books. In general, the *Iliad* rather than the *Odyssey* is recommended for school reading, because the college courses in Homer are based upon the latter poem.

Exercises in the writing of easy Attic prose should accompany both the elementary grammar work and the reading. For the latter part of the course a special book on composition may be employed, or the teacher may construct exercises bosed upon the current reading.

LATIN.—An applicant offering two units in Latin must have completed the beginners' Latin book, and must have read not less in amount than Cæsar, *Gallic War, I-IV,* which may be selected from Cæsar, *Gallic War* and *Civil War,* and Nepos, *Lives;* and he must further, have devoted the equivalent of one recitation period a week for one year to the writing of exercises in Latin prose composition.

N. B.—This preparation is sufficient to enable the student to enter Latin A or B in the University.

An applicant offering three units in Latin must have completed the foregoing requirements for two units. He must, in addition, have read not less in amount than Cicero, *the orations against Catiline,*

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for the Manilian Law, and *for Archias,* or Virgil, *Aeneid, I-VI,* which may be selected from Cicero, *orations, letters,* and *De Senectute,* and Sallust, *Catiline* and *Jugurthine War* or Virgil, *Bucolics, Georgics,* and *Aeneid,* and Ovid, *Metamorphoses, Fasti,* and *Tristia;* and he must, further, be prepared to meet the requirements in Latin prose composition described below for four units.

The Latin reading required of applicants offering four units* of Latin, without regard to the prescription of particular authors and works, must not be less in amount that Caesar, *Gallic War, I-IV,* Cicero, *the orations against Catiline, for the Manilian Law,* and *for Archias,* Virgil, *Aeneid, I-VI.* This amount of reading must be selected from the following authors and works: Caesar, *Gallic War* and *Civil War,* and Nepos, *Lives,* Cicero, *orations, letters,* and *De Senectute,* and Sallust, *Catiline* and *Jugurthine War,* Virgil, *Bucolics, Georgics,* and *Aeneid,* and Ovid, *Metamorphoses, Fasti,* and *Tristia.* The applicant must, further, have devoted the equivalent of one recitation period a week for two years to the writing of exercises in Latin prose composition.

The following is the scope of the examination of applicants who wish to offer four units in Latin as specified above, but who are not entitled to enter on diploma. Such applicants will be examined in translation at sight of both prose and verse. The vocabulary, construction, and range of ideas of the passages set will be suited to the preparation secured by the reading indicated above. Applicants will be examined also upon the following prescribed readings: Cicero, *orations for the Manilian Law* and *for Archias,* and Virgil, *Aeneid,* I, II, and either IV, or VI, at the option of the applicant, with questions on subject matter, literary and historical allusions, and prosody. Every paper in which passages from the prescribed reading are set for translation will contain also one or more passages for translation at sight; and applicants must deal satisfactorily with both these parts of the paper, or they will not be given credit for either part. The examinations in grammar and composition will demand thorough knowledge of all regular inflections, all common irregular forms, and the ordinary syntax and vocabulary of the prose authors read in school, with ability to use this knowledge in writing simple Latin prose. The words, constructions, and range of ideas called for in the examinations in composition will be such as are common in the reading of the year, or years, covered by the particular examination.

FRENCH.—The applicant who offers two units in French will be expected to pronounce French intelligently and with some fluency, to understand French when spoken in simple phrases and about familiar subjects, to read ordinary prose easily and accurately, and to write correctly in French simple sentences based on texts studied. This ability demands a firm grasp of the elements of grammar (such

* According to the recommendations of the Commission of Fifteen on College Entrance Requirements in Latin.

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as the conjugation of the verbs, both regular and irregular, the use of auxiliaries, the forms of the pronoun, the agreement of adjectives and particles, the main uses of the articles, and the order of words in the sentence), and such a familiarity with the structure of the sentence and common terms of expression and such command of vocabulary as may be given by the careful, well directed reading of three or four hundred pages of easy prose.

The applicant who offers three units in French should be able to read ordinary prose rapidly at sight, with clear understanding of the distinctions of tense and mode and all the common points of syntax, to reproduce in simple but connected French the substance of a narrative or dramatic text, and to follow ordinary explanations and commentaries made orally in French. In acquiring this ability accent should be laid on the rapid understanding of the French phrase, whether it be addressed to the eye or the ear. Much should be read, spoken, and dictated. At least six hundred pages of prose should be read, and in the end it should not be too easy.

The applicant who offers four units in French should be able to read at sight any French not offering very unusual difficulties of vocabulary or syntax, to translate into French a passage of simple English, and to carry on a conversation in French upon a familiar subject. He should have had, in addition to what is required for three units, at least one thousand pages of French chosen from standard authors, and he should be able to answer questions on the content and meaning of the works read as well as upon the language in which they are written.

SPANISH.—The applicant who offers two units in Spanish must be able to pronounce Spanish correctly, to take down easy dictation in Spanish, to translate intelligently easy Spanish prose, and to translate simple English sentences into Spanish sufficiently well to show a knowledge of the essentials of Spanish inflection and syntax. He should be able to understand and answer simple questions in Spanish.

The applicant who offers three units in Spanish should be able to read ordinary prose rapidly at sight, with clear understanding of the distinction of tense and mode and all the common points of syntax, to give in simple connected Spanish the substance of a narrative, and to follow ordinary explanations and commentaries made orally in Spanish. He should have read at least five hundred pages in modern prose.

The applicant who offers four units in Spanish should be able to read at sight any Spanish not offering unusual difficulties of vocabulary or syntax, to translate into Spanish a passage of simple English, and to carry on a conversation in Spanish upon a familiar subject. He should have read at least as much as the applicant who offers three units, and should have a distinctly firmer practical grasp of the language.

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GERMAN*.—The applicant who offers two units in German should be able to pronounce German correctly and should be thoroughly familiar with the everyday facts of the grammar. He should have read about 300-350 pages of standard modern prose and should be able to take part in a simple conversation in German on topics drawn from the works read. He should also be able to translate easy English prose into German.

The applicant who offers three units in German should, in addition to the work described above, be prepared as follows: He should have read two classics selected from the works of Lessing, Goethe, and Schiller, and about 250 pages of standard prose fiction and history. He should have a good knowledge of German syntax and should be able to write a short essay on some subject taken from the works read. He should also be able to translate ordinary English into German and to express himself in German grammatically and with ease on topics connected with his reading.

The four units in German include the foregoing requirements and additional preparation as follows: The reading of five standard dramas (exclusive of those read in the third year) selected from the works of Goethe, Schiller, Lessing, Heinrich von Kleist, and Grillparzer; a thorough command of German grammar, and the ability to speak and write German with considerable ease and correctness. The applicant should have written several longer essays on the works read.

HISTORY.—The applicant who offers one, two, or three units in history may select from the following list:

Ancient history to the year 800 A. D., one unit.
Mediæval and modern history, one unit.
English history, one unit.
United States history and government, one unit.

The study of mediæval history may, if preferred, be joined to the unit of ancient rather than modern history.

A year's work in general history, with the use of such a book as Meyer's *General History*, will still be accepted as one unit, though it is believed that better results will be obtained if a year is given to ancient history down to the fall of the Roman Empire (or, preferably, to the year 800 A. D.), and a year to mediæval and modern history.

The United States history is not the elementary work given in the lower grades, but an advanced course given in the later years of the high school.

* A fuller statement of the requirements in German may be found in the "Report of the Committee of the German Section of the Michigan Schoolmasters' Club on a Uniform High School Course in German." Copies of the report may be obtained by applying to the Professor of German.

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MATHEMATICS.—The three units in mathematics include algebra through quadratics, and geometry, both plane and solid (including spherical). Beman and Smith's *Elements of Algebra,* and the same authors' *New Plane and Solid Geometry* are mentioned to indicate the scope and character of the work required.

The applicant who presents two units in mathematics should have covered algebra through quadratics with one unknown and plane geometry. (See Beman and Smith's *New Plane Geometry*).

TRIGONOMETRY.—The one-half unit in trigonometry should cover the work in plane trigonometry as given in Hall and Frink's *Trigonometry* or an equivalent in other authors.

PHYSICS.—The unit in physics includes an amount represented by Carhart and Chute's *High School Physics.* The instruction in the classroom should be supplemented by work in the physical laboratory to the extent of at least one period a week throughout the school year.

CHEMISTRY.—The unit in chemistry covers the information which should be acquired in one year by the study of Brownlee's, Hessler and Smith's, Linebarger's, McPherson and Henderson, Newell's, Remsen's, or other similar text. The study of the text should be accompanied by laboratory work done by the student. A thorough working knowledge of a few fundamental principles is more to be desired than a superficial knowledge covering a wider range.

BOTANY.—The unit required of those who offer botany for admission is expected to include as much as a competent teacher, trained in laboratory methods, can accomplish with his classes in a year. No attempt is here made to indicate the exact extent of the ground to be covered, for the teacher should have large liberty in selecting material and topics as occasion requires; but it is recommended that one-half year be given to the form, structure, and habits of flowering plants, while the other half-year may be given to the natural groups of plants, physiology, and the adaptation of form and structure to environment.

The following text-books are recommended as offering numerous and helpful suggestions: Atkinson's *Elementary Botany;* Bailey's *Botany;* Barnes' *Plant Life;* Bergen's *Foundations of Botany;* Coulter's *Plant Relations and Plant Structures;* Spalding's *Introduction to Botany;* Stevens's *Introduction to Botany.* Ganong's *Teaching Botanist* is one of the most useful books for the teacher.

ZOOLOGY.—The unit or half unit in zoology must include laboratory and field work as well as class room exercises. Wherever possible, two class room periods should be available for each field or laboratory exercise. Two or three such exercises with two or three recitations per week make a suitable distribution of time.

The contents of the course should be determined in some measure

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by local conditions, such as size of class, accessibility of suitable conditions for field work, and training and interests of the teacher. Study of types is essential, but these should be selected largely from the local fauna. Such study need not take up the details of internal structure nor require dissection by the student. As far as possible the course should deal with living animals and should emphasize the functions, activities, and relations to environment of the types selected rather than their morphology. But the study of types should serve merely to introduce the student to the local groups to which they belong. The outlines of the classification of these groups, recognition in the field of their common local representatives, their habits, life histories, and ecology should form the larger part of the course. Emphasis should be placed on facts and principles that have a peculiar local interest and on the economic phases of the subject. In the small towns field work and topics related to agriculture may be emphasized. In the cities the work may have to be conducted largely on types and in the laboratory, but the types of economic importance should then be selected and the zoological aspects of civic biology given special attention.

The following text-books are suggested: Needham's *Elementary Lessons in Zoology;* Davenport's *Elements in Zoology;* Jordan and Kellogg's *Animal Life;* Linville and Kelly's *Text-books in General Zoology;* Hegner's *Practical Zoology;* Hunter's *Civic Biology;* Peabody and Hunter's *Elementary Biology;* Kellogg's *Animals and Man.*

GEOGRAPHY AND PHYSIOGRAPHY.—The applicant who offers one-half unit in Physiography should have studied in class a standard text-book, such as Dryer's *Lessons in Physical Geography;* Gilbert and Brigham's *Introduction to Physical Geography;* Davis's *Elementary Physical Geography;* Tarr's *New Physical Geography,* or an equivalent. The class work should be supplemented by field excursions. Meteorology is not required for the half unit credit.

One unit credit may be given in Physiography for study continued through at least one year under a competent instructor, and with the aid of adequate field excursions and laboratory practice. Meteorology will be included in such a course of study.

One-half or one unit of credit in Geography will be given for competent high school instruction in the general principles of geography as concerned with the relation of life to its environment, especially climate, surface, drainage, and soil. The following texts are suggested: Salisbury, Barrows, and Tower's *Modern Geography;* Dryer's *High School Geography.* One-half unit of credit will be given for a course in Economic Geography, based upon a modern text, such as Smith's *Commerce and Industry;* Brigham's *Commercial Geography.* In general credit will not be given for high school courses in political regional geography.

INTRODUCTORY SCIENCE.—One-half or one unit. Instruction in

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Introductory Science should precede all other courses in science and should preferably be given in the ninth grade.

The aim of this course should be to enable the student to interpret his environment and his relations to it. Teachers of Introductory Science are expected to give instruction also in one of the other sciences and to have had adequate preparation in one physical and one biological science. The ground to be covered by the course should be largely determined by local conditions. The following text books are suggested: Barber and others, *First Course in General Science;* Caldwell and Eikenberry, *General Science;* Snyder, *First Year Science;* Weckel and Thalman, *A Year in Science.*

PHYSIOLOGY.—One-half unit. The anatomy and physiology of the human body, and the essentials of hygiene. Recitations and laboratory work, with the aid of charts and models, as treated in the standard texts. The course should be preceded by at least a half year of zoology or a course in general biology.

OTHER SUBJECTS.—In addition to the subjects described above, other subjects recognized by the high school as counting toward graduation will be accepted to a maximum of three units. Among these subjects are the following:

Agriculture,	Manual and Industrial Training,
Commercial Branches,	Music,
Domestic Art and Science,	Normal Training Courses,
Drawing,	Public Speaking.

ADMISSION ON EXAMINATION

Applicants for admission who are not entitled to enter on diploma (see page 121) must take the entrance examinations in the entire fifteen units. They should register with the officer in charge of the examinations.

The applicant may divide the examination, taking one part either a year or a semester before the date of his admission, and the second part at the time of admission. But if he fail to secure the requisite number of units within the specified time he forfeits all credits for the subjects he may have passed.

The examination in the several subjects will be in writing and will be held in Tappan Hall in accordance with the schedules given below. Applicants presenting themselves too late for the scheduled examinations are required to pay an examination fee of five dollars.

The College conducts the examinations for admission to all colleges of the University. Examinations in those subjects accepted by other colleges, but not by this, will be provided for on application to the Registrar.

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SCHEDULE OF EXAMINATIONS FOR ADMISSION, SEPTEMBER, 1921

	Monday Sept. 19	Tuesday Sept. 20	Wednesday Sept. 21	Thursday Sept. 22	Friday Sept. 23
8-11		Geometry	Algebra	History	English Composition
1-3:30	English Literature	Physics	German Greek	French Spanish	Botany
3:30-6	Zoology	Physiography Geology	Latin Physiology	Trigonometry Introductory Science	Chemistry Astronomy

SCHEDULE OF EXAMINATIONS FOR ADMISSION, FEBRUARY AND JULY, 1922

	Thursday, Feb. 9 Thursday, June 29	Friday, Feb. 10 Friday, June 30	Saturday, Feb. 11 Saturday, July 1
8-10	English Composition	Algebra Trigonometry	Geometry
10-12	Botany Zoology	Physiography Geology	Chemistry
2-4	History	Physics Introductory Science	Latin Greek
4-6	Physiology	French German Spanish	English Literature Zoology

All examinations are held in Room 203, Tappan Hall.

In 1922-1923 these examinations will be held September 18 to 22, 1922, February 8 to 10, 1923, and June 28 to 30, 1923, respectively.

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ACCREDITED SCHOOLS

The privilege of sending pupils for admission on diploma is limited to schools that have been approved by the Faculty. On request of the proper authorities, the Faculty sends an officer of the University to visit a school and report upon its condition. If satisfied from the report of this officer that the school is taught by competent instructors, and is furnishing a good preparation to meet the requirements for admission, described on pages 120 to 131, the Faculty places the school on the approved list for a period not exceeding three years (inclusive of the year of visitation); reserving, however, the right to require another inspection if, within the period specified in each case, important changes affecting the course of study in the school, or the efficiency of the instruction, seem to make an examination necessary. Requests for inspection should be addressed to the High School Inspector, University of Michigan, Ann Arbor.

It is not the practice of the University to inspect secondary schools outside the state of Michigan. However, it is the policy of the University to give a school outside of Michigan the same status as that enjoyed with its own state university. Questions concerning the diploma privileges of schools outside of Michigan should be addressed to the Registrar of the University.

The list of schools in Michigan accredited to the University for the year 1920-1921 is given below:

Addison
*Adrian
*Albion
Algonac
*Allegan
*Alma
Almont
*Alpena
Amasa
*Ann Arbor
" St. Thomas' School
Arcadia
Armada
Athens
Bad Axe
Bangor
Baraga
Barrytown
*Battle Creek
Bay City, East Side
" West Side
" St. Mary's School
" Holy Rosary Academy
" St. James Academy
Bear Lake
*Belding
Bellaire
Bellevue
*Benton Harbor
Benzonia
Bergland
Berrien Springs
" " Emmanuel College
*Bessemer
*Big Rapids
*" " Ferris Institute
*Birmingham
Blissfield
Bloomingdale
*Boyne City
Breckenridge
Brighton
Britton
Bronson
Brown City
Buchanan
Burr Oak
*Cadillac
*Calumet
Capac
Caro
Carson City
Cass City
Cassopolis
Cedar Springs
Centerville

* Schools marked by the asterisk are also accredited by the North Central Association of Colleges and Secondary Schools.

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Central Lake
Champion
*Charlevoix
*Charlotte
Chassel
*Cheboygan
Chelsea
Chesaning
Clare
Clinton
Clio
*Coldwater
Coloma
Colon
Constantine
Coopersville
Corunna
*Croswell
*Crystal Falls
Davison
Dearborn
Decatur
Deckerville
Deerfield
Detroit, Annunciation
* " Cass
" Cathedral H. S.
* " Central
" Central, Evening
* " Eastern
" Holy Redeemer
" Holy Rosary
" Hudson School
* " Liggett School
* " Nordstrom
* " Northern
* " Northeastern
* " Northwestern
" St. Leo.
" St. Vincent
* " Southeastern
* " Univ. of Detroit Prep.
* " University School
* " Western
Dexter
*Dollar Bay
*Dowagiac
Dryden
Dundee
Durand
*East Jordan
East Lansing
East Tawas
Eaton Rapids
Eau Claire
Elk Rapids
Elsie
*Escanaba
Evart
Ewen
Fennville
Fenton
*Flint
Flushing
Fowlerville
Frankfort
*Fremont
Gagetown
Galesburg
Galien
Gaylord
*Gladstone
Gladwin
*Grand Haven
" " Akeley Hall
Gobleville
*Grand Ledge
Grand Marais
Grand Rapids, Catholic H. School for Boys
" " Catholic H. School for Girls
* " " Central
* " " John Calvin Col. Prep.
" " Mt. Mercy Academy
" " Sacred Heart Academy
* " " South
* " " Union
Grandville
Grant
Grass Lake
Grayling
Greenland
*Greenville
Grosse Isle
Gwinn
Hamtramck
*Hancock
" Suomi College
Harbor Beach
*Harbor Springs
*Hart
Hartford
*Hastings
*Highland Park
*Hillsdale
*Holland
" Hope College Prep.
Holly
Homer
Hopkins
*Houghton
Howard City
*Howell
*Hudson
Imlay City
*Ionia
*Iron Mountain
*Iron River
*Ironwood
" St. Ambrose
*Ishpeming
*Ithaca
*Jackson
" St. John's School
" St. Mary's School

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Jonesville
*Kalamazoo
* " Normal H. S.
  " Nazareth Academy
Kalkaska
Kent City
Laingsburg
Lake City
*Lake Linden
Lake Odessa
Lakeview
L'Anse
*Lansing
  " St. Mary's
*Lapeer
Lawrence
Lawton
Leslie
Linden
Litchfield
*Lowell
*Ludington
  " St. Simon's School
Mancelona
Manchester
*Manistee
*Manistique
Manton
Marcellus
*Marine City
Marion
Mariette
*Marquette
* " Normal High School
*Marshall
*Mason
Mayville
Mendon
*Menominee
Mesick
Middleville
*Midland
Milan
Milford
Millington
*Monroe
* " St. Mary's Academy
Morenci
Montague
Montgomery
*Mt. Clemens
  " " St. Peter's
*Mt. Pleasant
  " " Normal Preparatory
  " " Sacred Heart Acad.
*Muskegon
  " St. Mary's
*Munising
Nashville
National Mine
*Negaunee
Newaygo
New Baltimore
*Newberry
*Niles
North Adams
North Branch
Northville
*Norway
Olivet
Onaway
Onsted
*Ontonagon
Orchard Lake, St. Mary's
Orion
Ortonville
*Otsego
Ovid
*Owosso
Oxford
*Painesdale
*Paw Paw
Pellston
Pentwater
Petersburg
*Petoskey
Pigeon
Pinckney
Plainwell
*Plymouth
*Pontiac
*Port Huron
*Portland
Quincy
Rapid River
Reading
Reed City
Republic
Richmond
*River Rouge
  " " Our Lady of Lourdes
Rochester
Rockford
Rockland
Rogers City
Romeo
*Royal Oak
*Saginaw, Arthur Hill
* " East Side
  " St. Mary's School
  " SS. Peter & Paul's Sch.
St. Charles
St. Clair
St. Ignace
*St. Johns
*St. Joseph
*St. Louis
Saline
Sandusky
Saugatuck
*Sault Ste. Marie
  " " " Loretto Academy
Saranac
Schoolcraft
Scottville
Sebewaing
Shelby

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Shephard
*South Haven
South Lyon
Sparta
Spring Arbor Academy
*Stambaugh
Standish
Stanton
Stevenson Twp.
Stockbridge
*Sturgis
*Tecumseh
Tekonsha
Three Oaks
*Three Rivers
*Traverse City
" " St. Francis' School
Trenton
Trout Creek
Union City
Utica
Vassar
Vermontville
*Vicksburg
Vulcan
*Wakefield
Watervliet
Wayland
*Wayne
West Branch
White Pigeon
Whitehall
Williamston
*Wyandotte
Yale
*Ypsilanti
" Normal College H. S.
*Zeeland

CONDITIONAL ADMISSION

No applicant will be admitted who presents less than fifteen units.

An applicant for admission either on examination or diploma, who presents fifteen units from the lists on pages 122 and 131, but who is deficient in not more than two units there specified as mandatory, may be admitted conditionally; but any condition thus incurred must be removed during the first year of residence. No student who has an admission condition outstanding at the beginning of his second year of residence will be allowed to enter his classes until such condition is removed.

ADMISSION TO ADVANCED STANDING

1. A student who brings a certificate of standing from an approved college or university, showing that he has satisfactorily completed at least one year of the curriculum of the institution from which he comes, may be admitted without examination to equal standing in this College. A graduate of one of the stronger courses of an approved normal school, who brings an official certificate explicitly describing the extent and character of his work, may be given, without examination, such advanced standing as is justified by the course he has completed.

Advanced credit for work taken by correspondence is granted only upon examination.

The certificates above referred to must be presented to the Dean of the College as early as the fifteenth of October (or, if the student enter at the beginning of the second semester, as early as the first of March).

2. No advanced credit is granted for subjects studied in the high school, unless the student has taken a post graduate high school course of at least one semester. Such students may apply for

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advanced standing by presenting to the Registrar on October 21, (or, if they enter at the beginning of the second semester, on March 1) a statement showing the amount of work done in the subjects in which credit is asked. The Registrar will thereupon furnish a blank form for presentation to the professors in charge of the several subjects designated in the blank, who will determine the amount of credit to which the applicant is entitled in accordance with one of the following conditions:

Either the applicant must pass a satisfactory examination in the work presented; or the applicant must, during the first year of residence in the University, creditably complete in the department of study concerned a course presupposing a satisfactory knowledge of the work for which credit is asked.

All advanced credits shall be subject to revision at the end of the first year of residence.

Credits must be secured and returned to the Registrar as early as the first of November (or, if the student enter at the beginning of the second semester, as early as the fifteenth of March). An account once closed cannot be reopened without special permission of the Dean or Registrar.

ADMISSION OF STUDENTS NOT CANDIDATES FOR A DEGREE

Persons who wish to pursue studies in the College without becoming candidates for a degree may be admitted under the following conditions:

A. Persons over twenty-one and under twenty-five years of age, not provided for in Section B, may be admitted if they present satisfactory credentials, showing their preparation for academic work, and pass entrance examinations in nine units chosen from those accepted for entrance (see page 121). Certificates will not be accepted in place of these examinations. The nine units must include three units in English and one unit in Algebra. Before the beginning of the third year of residence, such students must make up the remaining units required for admission to regular standing.

B. Persons over twenty-one years of age who have taught two years in schools of grammar or high school grade, and all persons over twenty-five years of age may be admitted, provided they pass an examination in English, and show that they are qualified to pursue profitably the studies that they may desire to take up. In this examination in English, applicants will be asked to write brief essays on subjects that will be assigned, and to answer questions on the rudiments of English Grammar. The examination will be held in Room 203, Tappan Hall, at 8 A. M. Friday, September 23, 1921.

Should a student thus admitted subsequently become a candidate for graduation, he must pass all the examinations for admission re-

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quired of such a candidate, at least one year before the time when he proposes to graduate.

Such students who wish credit for studies pursued before admission are referred to the rules relating to advanced standing given above.

C. Persons whose preparatory courses have been interrupted by reason of military service or other approved war work, may, during 1919-1920 and 1920-1921, be admitted on trial upon the presentation of eleven units (at least nine of which shall be from Group I), gained either upon examination or upon official certification and recommendation of the principal of an accredited high school. Such students must completely satisfy the requirements for admission as regular students within two years after matriculation.

REQUIREMENTS FOR GRADUATION

Bachelor of Arts

The degree of Bachelor of Arts is conferred upon students who have earned one hundred twenty hours of credit (together with one hundred twenty points*) in accordance with the following requirements:

1. The credit must include Courses 1 and 2 in Rhetoric, which must be taken in the first year of residence.

2. In addition to the required courses in Rhetoric, the credit must include at least twelve hours from each of the following three groups, to be taken by the end of the third year of residence. (In the case of students who enter with advanced credit, or in other exceptional cases, the requirement that the group electives must be taken before the end of the third year may be waived upon application to the Advisory Committee, through the Dean).

Group I: Ancient Languages and Literatures, Modern Languages and Literatures, Rhetoric (other than Courses 1 and 2).

Group II: Mathematics, Astronomy, Physics, Chemistry, Mineralogy, Geology, Zoology, Botany, Psychology.

Group III: History, Political Economy and Sociology, Political Science, Philosophy, Education.

3. To complete the one hundred twenty hours required for graduation, the student may select from the work offered in the announce-

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* For the definitions and significance of grades and points see rule 4, page 144.

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ment of the College of Literature, Science, and the Arts, such courses as he is qualified to pursue subject only to the rules which follow:

a. Not more than eighty hours of elective studies may be taken in any one of the three groups specified above.

b. Not more than forty hours may be elected in any one department of study (as for example, Greek, Philosophy, Mathematics, History, etc.). In the department of Economics, however, a maximum of sixty hours may be elected; provided that not more than forty hours may be taken in any one of the subdivisions, Political Economy, Sociology, and Business Administration. In the department of Romance Languages also a maximum of sixty hours may be elected; provided that not more than forty hours may be taken in any one of the languages falling within that department.

c. At least two-thirds of the work taken in residence beyond the Sophomore year, must be in courses not open to first year students.

d. Every student, in December of his senior year, will receive from the Registrar an official statement of verification of his record.

Bachelor of Science

A student who has otherwise completed the requirements for the degree of Bachelor of Arts and has earned at least sixty of these one hundred twenty hours in mathematics and the physical and biological sciences may, at his option, receive the degree of Bachelor of Science, instead of Bachelor of Arts.

Bachelor of Science in Chemistry

The degree of Bachelor of Science in Chemistry is conferred upon students who have earned one hundred twenty hours of credit (together with one hundred twenty points) including the prescribed program of studies to be found on page 167.

Bachelor of Science in Forestry

The degree of Bachelor of Science in Forestry is conferred upon students who have earned one hundred twenty hours of credit (together with one hundred twenty points) including the prescribed program of studies given on page 172.

Bachelor of Science in Medicine

The degree of Bachelor of Science in Medicine is conferred upon those students who have completed the requirements for the degree of Bachelor of Arts and the first and second year of Medicine upon the Combined Curriculum. See page 146.

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Residence

No candidate will be recommended for the bachelor's degree who has been in residence at this University, registered solely in the College of Literature, Science, and the Arts, less than one academic year and who has earned while in residence here less than thirty hours of credit selected from courses offered in this College. The senior year, or its equivalent, must be spent in residence in this College.

For a matriculated student regularly enrolled in this College a Summer Session will be considered as equivalent to one-half a semester's residence.

Degrees with Distinction

Special distinction, to be recorded on the diploma, may be earned under the following conditions:

a. Students who have at graduation a total number of points greater by 165 than the number of hours earned in residence shall be graduated "with high distinction." In other words, in order to gain high distinction the student must earn at least 45 hours of A grade, while the remainder of his work done in residence must average B grade.

b. Students who have at graduation a total number of points greater by 135 than the number of hours earned in residence shall be graduated "with distinction." In other words, in order to gain distinction, the student must earn at least 15 hours of A grade, while the remainder of his work done in residence must average B grade.

c. Students who have at graduation a total number of points greater by 120 than the number of hours earned in residence, and who, because of consistently good work in a subject, receive the recommendation of the department, may, by vote of the Faculty, be graduated with special mention in that subject.

Attendance at Commencement

Only those who are present in person or who are especially excused by the Dean may receive their diplomas on Commencement Day. Others who have satisfied all the requirements for graduation, including the payment of the graduation fee, will receive their degrees at a subsequent meeting of the Board of Regents.

Graduation Fee

The graduation fee of ten dollars must be paid to the Treasurer of the University at least twenty-five days prior to the date of graduation. The same rule applies to the fee for the Teacher's Diploma; candidates for the Teacher's Diploma must have been enrolled with the Head of the Department of Education for a like period.

The same rule applies also to the fee for the Special Certificate in Business Administration.

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REGISTRATION

A. All undergraduate students in the College of Literature, Science, and the Arts are required, at the beginning of each year of residence, to enroll with the Registrar, to pay their fees to the Treasurer, and to file with the officer hereafter to be designated an election blank properly filled out, showing the courses they expect to pursue during the semester. These three things shall be considered as constituting Registration in this College.

All students entering this College for the first time must present their credentials to the Dean or Registrar and secure from him an admission card before enrolling with the Registrar.

B. Students may register at any time on or after Tuesday, September 20, 1921, up to and including Monday preceding the opening day. On and after the first day, students may register only upon payment of an additional fee of $5.00.

Freshmen are required to register not later than Saturday, September 24, in order that their classification may be completed before classes begin.

C. The election blanks of all first year students and of all students not candidates for a degree must be presented in person to the Committee on Elections. The election blanks of all other students must be presented in person to the Registrar. No credit is given for courses not properly elected. No student is allowed to elect merely a part of a course.

1. *First Year Elections.*—Rhetoric 1 and 2 must be taken the first year of residence, unless for exceptional reasons a postponement is allowed by the Committee on Elections. In addition to the work in Rhetoric, students having less than thirty hours of credit are expected to elect each semester three of the following courses, making a total of fifteen and one-half hours a week:

Greek, 1, 2 (or A, B).
Latin, 1 or 1*a*, 2 (or A, B).
French, 1, 2 (or 3, 4).
Spanish, 1, 2 (or 3, 4).
German, 1, 2 (or 3, 4).
History, 1, 2 (or 1*a*, 2*a*, or 1*b*, 2*b*).
Mathematics, 1, 2 (or 1E, 2E, or A, C).
Physics, 1, 2.
Chemistry, 1, 2 (or 2*b*, 3*a*).
Botany, 1, or 1*a*.
Zoölogy, 1, or 1*a*.
Geology, 25*a*, 25*b*.

If a student has credit either toward admission or toward graduation, for first year foreign language, he may elect the work of the second year. If his credit includes second year language, he may elect the work of the third year.

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Botany 1 and Zoölogy 1 should be elected in consecutive semesters, and may be taken in either order.

Courses, the equivalents of which have been offered for entrance, can not be again elected with credit.

In no case may courses not on this list be elected by first-year students without the permission of the Committee on Elections. The committee may be consulted between 9 a. m. and 5 p. m. daily, from Tuesday, September 20, to Monday, September 26, in the Auditorium of University Hall.

Number of Hours Allowed.—In accordance with the provisions of the foregoing rule, first-year students are required to elect fifteen hours a week: For all except first-year students the maximum number of hours a week that may be elected without special permission is sixteen, the minimum, twelve. The time necessary to earn the degree may also be materially shortened by attendance upon the Summer Session.

On special request students of superior scholarship may be granted additional hours, but in all cases such requests must be made each semester in writing on a blank form provided by the Registrar, and must be filed with the regular election blank, on which the elections should be made as if the request had been granted. No student will be granted permission to elect extra hours who is in his first semester of residence, or who in the preceding semester received a grade of D, or earned less than one and one-half times as many points as hours.

All requests for permission to take less than the minimum number of hours must be made in writing, stating the proposed election and the reasons therefor, and must be filed with the regular election blank, on which the election should be made as if the request had been granted.

D. Every student is required to file with the same officers, on Thursday or Friday of the second week preceding the final examination of the first semester of each year, an election blank, showing the studies he expects to pursue during the second semester. Election blanks presented after this date will be accepted only upon payment of $1.00. This fee may, in exceptional cases, be remitted upon application to the Dean.

E. Necessary changes in elections may be made during the first week of the semester, by filing with the Registrar a revised election blank on Thursday or Friday of that week. In the case of first-year students and of all special students such changes can be made only after consultation with the Committee on Elections.

F. After the first week changes may be made only by permission of the Administrative Board and upon the payment of a fee of

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$1.00. This fee may be remitted only by the Administrative Board. Such requests for permission to take up or drop studies must be made in writing on specially provided blank forms and in accordance with the rules printed thereon. Membership in the class does not cease until permission to drop the course has been granted by the Administrative Board (as represented by the Dean or the Registrar) and notice sent to the instructor. Authority to grant permission to drop, take up, or change courses has not been delegated to the instructors.

CONSULTATION HOURS.—Throughout the period of registration, September 20 to 26, 1921, representatives of all the different departments will keep consultation hours to advise upper-class students, both new and old, regarding the work of the department. Further announcement of the time (usually 10 to 12 daily) and place will be found at the head of the description of courses.

MEETING FOR FIRST YEAR WOMEN

All freshmen women are required to report at Barbour Gymnasium Wednesday, October 28, at 4 P. M., to receive general instruction from the Dean of Women and the Physical Director.

ADVISORY SYSTEM

General information may be obtained from the Committee of Faculty Advisers, who may be found in the Auditorium of University Hall throughout registration week and later at times and places to be announced. Students are urged to make this relation real and vital, and to consult their advisers freely whenever occasion arises. Information concerning rules and their interpretation should be obtained from the Dean and Registrar, who are also glad to advise with students on other matters.

RULES RELATING TO EXAMINATIONS AND MARKS

1. A final examination is given in every course in accordance with the schedule issued each semester. No examination may be held except as announced in this schedule, and no date of examination may be changed without special vote of the Faculty.

2. Students are required to take the examination in all courses except such as they may have dropped with consent of the Administrative Board.

3. Students are in no case examined at any other time than that set for the examination of the class in which the work has been done. In case of unavoidable conflicts a special examination during examination week may be arranged by the instructor with the consent of the Committee on Schedule.

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4. The final semester reports are made in accordance with the following system of marking: A, excellent; B, good; C, fair; D, deficient, passed without points; E, not passed; I, incomplete; X, absent from examination. These reports are not given out to the students by the instructors, but are regularly issued from the office of the Registrar.

Each hour of credit is valued in points as follows: A, three points; B, two points; C, one point; D, no points; E, no hours credit and no points. All advanced credit is regarded as of grade C.

This system of grades and points took effect in June, 1912. Each hour credit earned prior to that date is reckoned as of grade C.

5. The grade of D is an unsatisfactory mark. While it gives hours credit, it gives no points, which are equally required for graduation. It is considered as a deficiency. Like the other grades, it is final, and cannot be raised by subsequent work or examination.

6. If a student is reported E in any course, he can receive no credit for that course unless it has been again elected and pursued as though it had not been elected before.

7. A student may be reported Incomplete, if some small portion of his work remains unfinished, providing his standing in the course has been of grade C or higher. To secure credit, this work must be completed within one month after the beginning of the following semester; otherwise the course will be recorded as of grade E.

Any student who desires to remove an incomplete must first obtain from the Registrar a blank form for presentation to the instructor in charge of the course. This blank, when signed, must be filed with the Registrar within one week from the time of the examination. A fee of $1.00 is charged for blanks obtained after the specified time.

8. A student reported Absent from Examination may, on presenting a satisfactory excuse, receive permission from the Administrative Board to take the examination within one month after the beginning of the following semester. In case such a supplementary examination be not taken and passed. the course will be recorded as of grade E.

Any student who desires to take an examination from which he was absent at the regular time and with satisfactory excuse must make application to the *Registrar* upon a special blank during the *first two weeks* of the following semester. The examination will then be held, under supervision of the Registrar, during the fourth week of the semester.

9. Students of other schools and colleges who absent themselves from the courses elected in this College forfeit the privilege of electing courses in this College.

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TRANSCRIPTS OF RECORDS

Students wishing statements of credits in order to transfer from this College to another, or for other purposes, should make early and seasonable application for the same. No such statements will be made out during the busy periods of examination and registration, September 15 to October 15, February 1 to March 1, and June 15 to July 1.

RULE RELATING TO LABORATORY COURSES

No credit is given for laboratory courses until all laboratory charges are paid, and in all cases where such charges are not paid within two weeks after the close of the semester in which the work was taken, a fine of $1.00 is imposed before credit is given. All regular laboratory deposits are payable in advance.

This report of grade withheld is treated as an incomplete. In order to secure credit for the course, the student must, within one month after the beginning of the following semester, procure from the Registrar a blank, to be returned to him as soon as signed by the instructor. After two weeks from the close of the semester, this blank will be issued only upon presentation of the receipt of the Treasurer of the University for the $1.00 fine.

RULE RELATING TO DEFICIENCIES IN ENGLISH

Any instructor who finds the written work of a student seriously defective in its English is expected to report the case, together with specimen papers, to a committee consisting of the Dean and the Professor of Rhetoric, who shall have power to require additional work in composition without credit.

RULES RELATING TO DELINQUENTS

1. *Warning.*—A student whose work is unsatisfactory is warned. In all such cases notice of the character of the work is sent to the student and to his parents or guardian.

2. *Probation.*—A student whose work is extremely unsatisfactory is put on probation. This means that he is in imminent danger of dismissal from the University. During the period of probation the student is on trial to prove his fitness to do work in the University. He is required to devote all his time to his studies.

3. All students placed on probation are required to report to the Bureau of Mental Tests and Measurements for an examination, the results of which are placed on file in the office of the Dean for such use as the administrative authorities concerned may deem wise.

4. Any student renders himself liable to suspension for a breach of discipline who, while upon probation, engages in any public exhibition, contest, game, or other public University activity.

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RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For rule governing participation in public activities, see the catalogue, page 101.

RULES RELATING TO ABSENCE

1. All absences should be explained to the Committee on Attendance within one week. Every absence not explained within two weeks will be marked unexcused. Absence pending adjustment for more than one week will be marked unexcused.
2. Each absence on the day immediately preceding or following a vacation or holiday shall be counted as three.
3. Excessive absence shall render the student liable to a reduction in general credit for the semester.
4. Willful disregard of summons from the Attendance Committee or the Dean shall render the offender liable to suspension.

PHYSICAL EDUCATION

All freshmen men and all freshmen and sophomore women in the College of Literature, Science, and the Arts and the Colleges of Engineering and Architecture are required to take two hours a week of Physical Education. A detailed description of the facilities for instruction and the nature of the course is given on page 79.

MILITARY AND NAVAL SCIENCE AND TRAINING

The courses offered in the Coast Artillery Unit of the Reserved Officers' Training Corps are open to election by students in the College of Literature, Science, and the Arts. A detailed statement regarding the nature of the courses is given on page 84.

COMBINED CURRICULA IN LETTERS AND MEDICINE

A.B. and M.D.*

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and of Doctor of Medicine in the Medical School, or in the Homœopathic Medical School, may, by enrolling on the Combined Curriculum in Letters

* All students entering upon the Combined Curriculum must satisfy fully the requirements for admission to the College of Literature, Science, and the Arts. They must present two units of Latin and should also present Plant Trigonometry, Physics, and Chemistry. Otherwise an attendance upon one Summer Session will ordinarily be necessary in addition to the residence herein prescribed. It is also advisable that French or German, Botany, and Zoology be included in the high school course.

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and Medicine, shorten from eight years to seven the time required to earn the two degrees. This privilege is open only to students who throughout their course maintain a uniform record of good† scholarship. The work is done under the direction of a Committee of five members representing the college and school. With the consent of the Committee in charge, a candidate for the degree of Bachelor of Arts who has been at least one year, and has 90 or more hours to his credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll upon the combined curriculum; that is, while continuing his registration in this college he may also register in the Medical School, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete within one year the specific requirement described in the following paragraphs.

All students who desire to enter upon the Combined Curriculum in Letters and Medicine must, before May 15 of the year preceding double registration, file with the Registrar, upon a blank to be obtained from him, a petition to be granted that privilege.

When the student so registered in the college or school has completed the first year of the medical curriculum, and not less than 90 hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has completed the requirements for graduation from the latter college (see page 138) and provided his work has included the following courses, and satisfied the group requirements:

Rhetoric, 6 hours, including Courses 1 and 2.
French and German, 16 hours of either one, and 8 hours of the other. (Each unit of French or German offered in the preparatory work reduces by four hours the requirement in that language. One year of foreign language, however, must be taken in College.)
English, 6 hours.
Electives from Group III, 12 hours, unless excused in part by the Committee.
Psychology, 6 hours.
Physics, 8 hours, including two hours of laboratory work, (not including Physics Z, which is a prerequisite, as is also plane trigonometry.
Chemistry, general, qualitative, and organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Physical Chemistry, 4 hours.
Zoölogy, 10 hours.
Botany, 4 hours.
Total, 90 hours.

† The applicant will be expected to have earned at least one and one-third times as many points as hours.

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Suggested electives: Latin or Elementary Greek, 8 hours; History, or Political Economy, or Philosophy, 8 hours; Qualitative Analysis, 4 hours; Organic Chemistry, 5 hours.

B.S. (in Med.) and M.D.

Students who so desire, may obtain the degrees of Bachelor of Science in Medicine and Doctor of Medicine in six calendar years by complying with the requirements above set forth except that they must complete the first and second years of the Medical Curriculum, and that the credit required from the College of Literature, Science, and the Arts instead of 90 hours, shall be 75 hours, of which at least 67 hours must be completed before they may enter upon the combined curriculum, and shall include the following courses, and satisfy the group requirements:

Rhetoric, 6 hours, including Courses 1 and 2.
French or German, 16 hours of one. (Each unit of French or German offered in the preparatory work reduces by 4 hours the requirement in that language. One year of foreign language, however, must be taken in College.)
Electives from Group III, 12 hours.
Physics, 8 hours, including two hours of laboratory work, (not including Physics Z, which is a prerequisite, as is also plane trigonometry.
Chemistry, general, qualitative, and organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Zoölogy, 4 hours.
Botany, 4 hours.
Total, 75 hours.

The completion of this curriculum will ordinarily require two and one-half years or two years and two summer sessions, in the College of Literature, Science, and the Arts. Students whose scholarship is sufficiently high may apply for permission to elect a limited number of extra hours.

Electives are suggested from the courses before mentioned.

General chemistry, qualitative analysis, and organic chemistry must be elected in the order named. All students should complete general chemistry the first year; those presenting chemistry for entrance are advised to take both general chemistry and qualitative analysis the first year, enabling them to elect organic chemistry the first semester of the second year.

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COMBINED CURRICULUM IN LETTERS AND LAW

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and of Bachelor of Laws in the Law School, may, by enrolling on the Combined Curriculum in Letters and Law, shorten from seven years to six the time required to earn the two degrees. This privilege is open only to students who throughout their course maintain a uniform record of good scholarship.* The work is under the direction of a joint committee of five members, representing the college and school. With the consent of the committee in charge of a candidate for the degree of Bachelor of Arts, who has been a student in the College of Literature, Science, and the Arts for at least one year, and has 92 or more hours to his credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll on the combined curriculum; that is, while continuing his registration in this college he may also register in the Law School, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete within one year the specific requirement described in the following paragraphs.

All students who desire to enter upon the Combined Curriculum must, before May 15 of the year preceding double registration, file with the Registrar, on a blank to be obtained from him, a petition to be granted that privilege.

When the student so registered in the college and school has completed the first year of the law curriculum and not less than ninety-two hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has completed the requirements for graduation from the latter College (see page 138), and provided his work has included the following courses and satisfied the group requirements:

Rhetoric, 12 hours, including Courses 1, 2, 3, and 4.

Latin, or French, German, or Spanish, 8 hours.

English Literature, 6 hours.

English History, 1*a* and 2*a*, or 3 and 4.

Mathematics, or a science including laboratory work, 8 hours.

Electives from Group II, 4 hours.

Total, 92 hours.

Latin is strongly urged as desirable for every student preparing to study Law.

In addition to the required courses, the student is advised to elect at least forty hours from the following subjects:

* The applicant will be expected to have earned at least one and one-third times as many points as hours.

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Latin or Elementary Greek, 8 hours, Courses 3 and 4; French, German, or Spanish, 16 hours; History, 14 hours, including Courses 14 and 15; Political Science, 12 hours; Economics, 16 hours, including Courses 1, 6, 9, 9*a*, 15, and 38; Philosophy, 7 hours, including Logic, or Psychology, and Political Philosophy or Ethics; Mathematics, 2 hours, Course 51; Public Speaking, 4 hours.

TWO YEAR PROGRAM

PRELIMINARY TO THE STUDY OF LAW

The following program in the College of Literature, Science, and the Arts is suggested by the Faculty of the Law School for students looking to the study of law who are unable to devote more than two years to collegiate preparation:

FIRST YEAR

Rhetoric, Courses 1, 2.
Latin, Courses 1, 2.
History, Courses 1*a*, 2*a*.
Mathematics, Courses 1, 2.

SECOND YEAR

Rhetoric, Courses 3, 4.
Latin, Courses 3, 4.
English Literature, 6 hours.
Political Science, Courses 1, 2.
History, Courses 14, 15.
Economics, Courses 1, 2.
Philosophy, Course 9 (Logic).
Public Speaking, Courses 1, 2.

All students in the College of Literature, Science, and the Arts, who contemplate the study of law, are urged to select so far as possible from the program outlined above. Those who wish to elect work in oratory and debating should take this work before entering the Law School. The substitution of a modern language for Latin may be made in the case of students whose preliminary work has not included the necessary preparation, though students of law are strongly urged to include Latin in the curriculum.

COMBINED CURRICULUM IN LETTERS AND DENTAL SURGERY*

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and of Doctor of Dental Surgery in the College of Dental Surgery, may, by enrolling on the Combined Curriculum in Letters and Dental Surgery, shorten from seven years to six the time required to earn the two degrees. This privilege is open only to students who throughout their course

* This combined Curriculum will undergo considerable change because of the lengthening of the Dental curriculum to four years, and the requirement, in October, 1921, of one year of collegiate work for admission to the Dental College. Necessary modifications will be announced next year.

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maintain a uniform record of good† scholarship. The work is under the direction of a Committee of five members representing the two Colleges. With the consent of the Committee in charge, a candidate for the degree of Bachelor of Arts, who has been a student in the College of Literature, Science, and the Arts, for at least one year, and has 90 hours or more hours of credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll upon the combined course; that is, while continuing his registration in this college he may also register in the College of Dental Surgery, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete within one year the specific requirements described in the following paragraphs.

Students who desire to enter upon the Combined Curriculum in Letters and Dental Surgery must, before May 15 of the year preceding double registration, file with the Registrar, on a blank to be obtained from him, a petition to be granted the privilege.

When the student so registered in the two colleges has completed the first year of the dental curriculum, and not less than 90 hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has completed the requirements for graduation from the latter college (see page 138), and provided his work has included the following courses, and satisfied the group requirements:

Rhetoric, 6 hours, including Courses 1 and 2.
French and German, 16 hours of either one, and 8 hours of the other. (Each unit of French or German offered in the preparatory work reduces by 4 hours the requirement in that Language.)
English, 6 hours.
History, 8 hours.
Electives from Group III, 4 hours.
Physics, 8 hours, including laboratory work.
Chemistry, general, qualitative, and organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Zoölogy, 10 hours.
Botany, 4 hours.
Total, 90 hours.

Suggested electives: Latin or Greek, 8 hours; Philosophy, 3 hours; Physical Chemistry, 3 hours.

† The applicant will be expected to have earned at least one and one-third times as many points as hours.

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COMBINED CURRICULUM IN LETTERS AND NURSING

Students who so desire, may obtain the degree of Bachelor of Science in the College of Literature, Science, and the Arts, and the Nurse's diploma, from the Training School for Nurses, by enrolling on the Combined Curriculum in Letters and Nursing. This privilege is open only to students, who throughout their course, maintain a uniform record of good* scholarship. The work is under the direction of a joint committee of five members, representing the college and school. With the consent of the committee in charge a candidate for the degree of Bachelor of Science, who has been a student in the College of Literature, Science, and the Arts for at least one year, and has 90 or more hours to her credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll on the combined curriculum; that is, while continuing her registration in this college she may also register in the Training School for Nurses, provided the work she has already completed includes a sufficient number of the courses enumerated below to enable her to complete within one year the specific requirement described in the following paragraphs.

All students who desire to enter upon the Combined Curriculum must, before May 15 of the year preceding double registration, file with the Registrar, on a blank to be obtained from him, a petition to be granted that privilege.

When the student so registered in the college and school has completed the two years of the prescribed curriculum in Nursing and not less than ninety hours in the College of Literature, Science, and the Arts, she will be recommended for the degree of Bachelor of Arts, provided she has completed the requirements for graduation from the latter College (see page 138), and provided her work has included the following courses, and satisfied the group requirements:

FIRST YEAR

FIRST SEMESTER	HOURS	SECOND SEMESTER	HOURS
Rhetoric 1	3	Rhetoric	3
Chemistry 1	4	Chemistry 2	4
		Zoölogy 1	4
Recommended Electives:			
History 1	4	History 2	4
Botany 1	4	Foreign Language	4
Foreign Language	4		
Total	15	Total	15

* The applicant will be expected to have earned at least one and one-third times as many points as hours.

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SECOND YEAR

Rhetoric	3	Rhetoric 4	3
Chemistry 3*a*	4	Chemistry 10	4
Zoölogy 9	5	Zoölogy 11	4
Recommended Electives:			
Physics 1	4	Physics 2	2
Foreign Language	4	Foreign Language	4
Total	16	Total	16

THIRD YEAR

English 1	3	English 2	3
Sociology 19	4	Sociology 29	2
Psychology 8*a*	3	Bacteriology 2	5
Philosophy 1	3		
Recommended Electives:		Psychology 8*b*	3
Public Speaking 1	3	Psychology 28	2
		Hygiene 1	3
Total	16	Total	16

FOURTH YEAR

Elementary Nursing; Elementary Materia Medica; History of Nursing and Nursing Ethics; Application of Nursing Principles by Demonstration and Practice; Nutrition and Foods; Hygiene.

FIFTH YEAR

Pediatric Nursing; Nursing in Contagious Diseases; Symptomology; Materia Medica; Orthopedic Nursing; Urinalysis; Nursing Principles.

Throughout the fourth and fifth years practical work is given in the University Hospital coördinately with the theoretical instruction, so arranged as not to interfere with successful pursuit of the studies which the College accepts in lieu of the usual work of the senior college year.

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SUGGESTED PROGRAMS IN THE CLASSICAL LANGUAGES AND IN LATIN OR GREEK AND MODERN LANGUAGE

The division of subjects among the years of the college course indicated below is desirable, but not mandatory. The number of hours mentioned is the number to be elected each semester.

Candidates for the Teacher's Diploma should elect Course 7 in Philosophy, (General Psychology) in the second year, four hours of Education in the third year, and seven in the fourth year. Otherwise the work of the fourth year is wholly elective. The group requirements for graduation should be completed by the end of the third year.

CLASSICAL PROGRAM

FIRST YEAR	HOURS	SECOND YEAR	HOURS
Greek	4	Greek	3 or 4
Latin	4	Latin	3 or 4
Mathematics, or a Laboratory Science	4	History (preferably Greek and Roman), or other third group subjects	3 or 4
Rhetoric	3		

THIRD YEAR	HOURS
Greek	2 or 3
Latin	2 or 4
Third Language	4

*LATIN—MODERN LANGUAGE PROGRAM

FIRST YEAR	HOURS	SECOND YEAR	HOURS
Latin	4	Latin	3 or 4
Modern Language	4	Modern Language	3 or 4
Mathematics, or a Laboratory Science	4	History (preferably Greek and Roman), or other third group subjects	3 or 4
Rhetoric	3		

THIRD YEAR	HOURS
Latin	2 or 4
Modern Language	2 or 4
Third Language	4

* The Latin-Modern Language Program may be converted into a Greek-Modern Language Program by the substitution of Greek for Latin wherever it occurs in the above program.

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SUGGESTED PROGRAM FOR STUDENTS SPECIALLY INTERESTED IN THE STUDY OF FOREIGN LANGUAGES

Freshman Year

Two foreign languages, 8 hours (Greek, Latin, French, Spanish, or German). *a*

Mathematics, or a Science (Biology, Chemistry, Physics, or Physiography), 4 hours.

Rhetoric, 3 hours.

All Freshman subjects continue throughout the year.

Sophomore Year

Two foreign languages continued, 8 hours, each semester.

Third foreign language begun, 4 hours, each semester. *b*

Philosophy 7 (Psychology), 3 hours, and Zoölogy 3, 1 hour, first semester, and Philosophy 1, 3 hours, second semester, *c*; or

Mathematics, or English, or Science, or History (General, or English, or Ancient), 4 hours, throughout the year.

Junior Year

Languages of main interest, 5 or 6 hours, each semester.

Third group requirement, 4 or 5 hours, each semester, chosen from Education A, 1, 2, and 5, Political Science, 1 and 2, Philosophy, History, or Sociology. *d*

Other electives, 2 hours each semester.

Senior Year

Major language work should not exceed 6 hours each semester.

Minor language work should not exceed 4 hours each semester.

Other electives, 6 or more hours, each semester.

Notes

a. Continuation of one or both of the languages studied in the high school is recommended; two new languages should not be begun in the same year.

b. Students specially interested in the study of Latin are recommended to begin Greek at this time, if it has not been taken previously; those presenting four units of Latin and two of Greek for admission are advised to continue both Latin and Greek in the first year, begin German or French in the first semester of the second year, and begin French or German in the first semester of the third year.

c. The student should complete the second group requirement during the year; by electing Psychology candidates for the Teacher's Diploma will at the same time be meeting one of the requirements for that diploma.

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d. Candidates for the Teacher's Diploma should elect 4 or 6 hours in the department of Education during the year. The third group requirements must be completed during the year.

e. Candidates for the Teacher's Diploma will elect enough hours in the department of Education to complete the requirements of eleven hours.

CURRICULUM IN JOURNALISM

Requirements for Admission

Admission to the curricula in Journalism is restricted to persons who are candidates for a degree in the College of Literature, Science, and the Arts. Candidates may enroll with the Chairman of the Committee at any time not later than the beginning of the senior year, though an earlier enrollment is desirable.

Program of Study

In the selection of studies and the apportionment of hours, as indicated below, two classes of students have been taken into account: (A) those who wish to pursue a general course, (B) those who wish to fit themselves for a particular kind of writing or a special department of a newspaper. The elections may be modified to meet the needs of individuals.

The specific courses in journalism are given in the department of Rhetoric, where a description of them will be found.

A

GENERAL CURRICULUM

	HOURS		HOURS
Newspaper Work	18	Economics	10
Other Courses in Rhetoric	12	Sociology	4
English	10	Philosophy	3
Foreign Language	16	Law	3
History	16	Science (including Psychology)	12
Political Science	6	Electives	10

B

SPECIAL CURRICULA

1.

For students who wish to specialize in History, Government, and Politics.

	HOURS		HOURS
Newspaper Work	14	Political Science	16
Other Courses in Rhetoric	12	Economics	10
English	10	Sociology	4
Foreign Language	16	Law	6
History	20	Science	12

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2.

For students who wish to specialize in Economics and Sociology.

	HOURS		HOURS
Newspaper Work	14	Economics	24
Other Courses in Rhetoric	12	Sociology	12
English	10	Law	6
Foreign Language	16	Science	12
History	14		

3.

For students who wish to specialize in reviewing, and in dramatic art, and musical criticism.

	HOURS		HOURS
Newspaper Work	18	History	14
Other Courses in Rhetoric	15	Philosophy	7
English	20	Music (or other arts)	12
Foreign Language	24	Science	12

4.

For students who wish to specialize in technical journalism.

	HOURS		HOURS
Newspaper Work	18	Political Science	6
Other Courses in Rhetoric	15	Economics	20
English	10	Sociology	4
Foreign Language	16	Law	6
History	14	Science	12

Special Lectures

Lectures upon newsgathering, newswriting, copy reading, editorial writing, newspaper management, and other important features of newspaper method and procedure, will be given in the course of the year by prominent newspaper men.

For printed information concerning the requirements for admission to the University, dates of entrance examinations, conditions of admission to advanced standing, or requirements for graduation, address the Secretary of the University, Ann Arbor, Michigan. Correspondence on these subjects should be addressed to Dean J. R. Effinger, or to the Registrar. Correspondence on the courses in journalism should be addressed to Professor F. N. Scott, Ann Arbor, Michigan.

CURRICULUM IN TRAINING FOR SECRETARIAL WORK

All the various collegiate courses constituting a program of studies in training for secretarial work are offered. Students desiring to pursue such a program will be assisted in selecting and arranging these courses.

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CURRICULUM IN MUNICIPAL ADMINISTRATION

The curriculum in municipal administration is organized as a special program of study leading to the degree of Master of Arts, or Master of Science, in Municipal Administration. The last year of work must be pursued in the Graduate School, but many of the prescribed courses should be taken as undergraduate work.

The program of courses is designed to meet the needs of all those who aim to take an active part in the guidance of municipal affairs. It should be of greatest utility in training for municipal office, whether of bureau, division, or department head, of mayor, or director under the commission form of city government, or of city manager; and for such public or semi-public positions as director of bureaus of municipal reference and research or as civic and commercial secretary.

It is desirable that students intending to pursue this program should communicate as early as practicable in their academic period with the chairman of the Committee on the Program of Courses in Municipal Administration. An announcement of this program is issued in the form of a special bulletin by the University and may be obtained by addressing the Secretary of the University. General correspondence concerning the course may be directed to the Chairman of the Committee, Professor Robert T. Crane, Bureau of Government, University of Michigan. Inquiries regarding entrance requirements or credit for advanced work should be addressed to Dean J. R. Effinger, or to the Registrar.

The privilege of making certain elections in the College of Engineering, the Medical, or the Law School, is granted to students enrolled in this curriculum.

In addition to the requirement of elementary courses in Political Science and Political Economy, each equivalent to six semester hours work, twelve semester hours of science, and twelve semester hours of foreign language, the courses listed below are either required or elective for students looking forward to a degree in municipal administration:

Municipal Government, 6 hours; Municipal Administration, 4 hours; Administration of Municipal Finance, 2 hours; Local Government, 2 hours; Public Finance, 3 hours; Principles of Accounting, 3 hours; Municipal Accounting, 2 hours; Mathematical Theory of Finance, 3 hours; City Planning and Civic Improvement, 3 hours; Water Works, 3 hours; Sewerage, 2 hours; Sanitary Science, 1 hour; Municipal Engineering, 2 hours; Roads and Pavements, 2 hours; Specifications and Contracts, 1 hour; Highway Laboratory, 2 hours; Municipal Lighting, 2 hours; General Hygiene, 3 hours; Administration of Health Laws, 2 hours; Problems in Sociology, 3 hours; Community Problems, 2 hours; Municipal Corporations, 2 hours; Public Officers, 2 hours.

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CURRICULA IN BUSINESS ADMINISTRATION

The Curricula in Business Administration are suggested four-year programs of study arranged for students who are regularly enrolled in the College of Literature, Science, and the Arts, and who are candidates for a degree. They are intended to meet the needs of those persons who desire to fit themselves, by a combination of liberal culture and professional studies, for positions as executives and experts in industrial establishments or the public service.

Such programs are now offered in General Business, Accounting, Banking, Insurance, and Railway Administration. The programs cover four years of undergraduate study. Of the 120 semester hours required for the bachelor degree, from 70 to 100 hours are prescribed, of which between 25 and 50 hours are of a professional or technical character.

Persons desiring to pursue these programs must gain admission to the College of Literature, Science, and the Arts, as candidates for a degree, or to the Graduate School. They are then expected to enroll with the Secretary of the Committee on Business Administration at the beginning of their first year of residence or as soon thereafter as possible, but not later than the beginning of their last year of residence.

It is not intended that the precise requirements set forth in these programs shall be rigidly insisted upon. Under the advice of the Secretary of the Committee, the student will be permitted to modify his program or arrange one better adapted to his special needs. In all cases, however, students must take courses 1 and 2 in Mathematics, and a minimum of 30 hours in Political Economy and Business Administration, exclusive of Courses 1 and 2. (For the purpose of this requirement, Courses 51, 52, 53, 54, 55, 56, 67, and 68 in Mathematics will be considered as Business Administration.) In addition to these requirements all students must observe the restrictions governing their election established by the faculty of the College of Literature, Science, and the Arts. Students enrolled in these programs having 60 hours to their credit and a good record for scholarship may, with the consent of the Committee, elect in the College of Engineering the courses designated in these programs. For all such courses elected outside the College of Literature, Science, and the Arts an authorization blank, properly filled out, must be secured from the Secretary of the Committee. The credit so obtained outside of the College will be counted toward the literary degree, only on condition that the student finishes the four-year program in which the outside course occurs.

Any student who, in covering the work required for the degree of Bachelor of Arts, completes any one of the suggested programs of study, or any similar program which may be approved by the Committee on Business Administration, as outlined above, will be entitled to receive, in addition to his diploma, a special certificate conferred by the Board of Regents upon the recommendation of the Faculty.

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Students who have secured a bachelor's degree as a result of studies along other lines will find in the more advanced courses here offered an opportunity for a profitable specialization; and the rules governing graduate work will apply to graduate students who enroll themselves as students in these courses. Those interested in this grade of studies should consult the Annual Announcement of the Graduate School.

Graduate students who complete satisfactorily an approved program of study in Business Administration extending for at least one year will be entitled to receive a special certificate, whether or not they are candidates for graduate degrees.

A special announcement of the Curricula in Business Administration may be obtained by addressing the Secretary of the University. Correspondence concerning the courses may be directed to Professor I. Leo Sharfman, Ann Arbor. Inquiries concerning requirements for entering the University, or credit for advanced work, should be addressed to Dean J. R. Effinger, or to the Registrar.

SUGGESTED PROGRAMS OF STUDY

In order to make clear the character of the work offered in Business Administration, there are inserted at this point, in tabular form, five suggested programs of study.

In the selection of electives the student should consult the instructor in charge of the particular program in which he is interested.

Not more than sixteen hours a week may be elected except by special permission obtained from the Committee on Extra Hours in accordance with the rules of the College of Literature, Science, and the Arts.

General Business

This program includes a balanced arrangement of studies selected from each department of business administration: law, accounting, finance, commerce, and the executive art. It is recommended to students who desire to prepare themselves to become general executives, that is to say, who desire to prepare themselves for such positions as that of branch manager, office manager, general superintendent, sales manager, employment manager, or superintendent in charge of industrial relations. It is further recommended to students who intend to specialize in graduate years, or who are not yet decided in what direction their advanced work will be carried.

FIRST YEAR

FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Electives	8	Electives	8
	15		15

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	SECOND YEAR		
Economics 1	5	Economics 2	3
Economics 38	4	Economics 39	4
Electives	7	Electives	9
	16		16
	THIRD YEAR		
Economics 9	3	Economics 6	3
Economics 15	3	Economics 10	2
Economics 31	3	Economics 32	3
Electives	7	Economics 33	2
		Electives	6
	16		16
	FOURTH YEAR		
Economics 3	3	Economics 33*a*	2
Economics 31*a*	2	Economics 34	2
Economics 32*a*	2	Economics 47	3
Economics 46	3	Electives	9
Electives	6		
	16		16

Accounting

This program is intended (a) for those who wish to enter the profession of public accounting, (b) for those who expect to occupy positions as accountants in financial, manufacturing, mercantile, or public utility industries, (c) for those who are preparing themselves for positions as accountants or statisticians to municipalities and regulative bodies such as railroad or public service commissions, and (d) for those who are intending to teach accounting.

Students who have completed the first two years of the program in Accounting are prepared to take Course 48 in Insurance Accounting. This would fit them for responsible positions in various home office departments of insurance companies and state departments of insurance. It would not be necessary for them to take the advanced courses in Mathematics required of those intending to enter the actuarial profession.

FIRST YEAR

FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Electives	8	Electives	8
	15		15

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SECOND YEAR

Economics 1	5	Economics 2	3
Economics 38	4	Economics 39	4
Mathematics 51	3	Mathematics 52	3
Electives	4	Electives	6
	16		16

THIRD YEAR

Economics 4	3	Economics 6	3
Economics 9	3	Economics 10	2
Economics 15	3	Economics 43	3
Economics 40	3	Electives	8
Electives	4		
	16		16

FOURTH YEAR

Economics 37	3	Economics 16	2
Economics 44	2	Economics 36*a*	3
Economics 46	3	Economics 42	2
Electives	8	Economics 43*a*	2
		Economics 47	3
		Electives	4
	16		16

Banking

This program is designed for students who expect to enter banking or allied fields. Its aim is to enable the student to master the principles underlying financial operations and, at the same time, to provide him with a foundation of cultural studies.

FIRST YEAR

FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Electives	8	Electives	8
	15		15

SECOND YEAR

Economics 1	5	Economics 2	3
Electives	11	Electives	13
	16		16

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	THIRD YEAR		
Economics 9	3	Economics 6	3
Economics 15	3	Economics 10	2
Economics 38	4	Economics 39	4
Electives	6	Electives	7
	16		16
	FOURTH YEAR		
Economics 8	2	Economics 8*a*	2
Economics 11	2	Economics 12	2
Economics 32	3	Economics 33	2
Economics 37	3	Economics 47	3
Economics 46	3	Electives	7
Electives	3		
	16		16

Railway Administration

This program is designed to meet the needs of four classes of students: (a) those who wish to enter the administrative department of railways, (b) those who desire to become attached to federal or state railway commissions, (c) persons preparing for the statistical or appraisal work of banking or brokerage houses and, (d) those desiring to understand the transportation problem as a part of a general education.

	FIRST YEAR		
FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Electives	8	Electives	8
	15		15
	SECOND YEAR		
Economics 1	5	Economics 2	3
Mathematics 51	3	Economics 6	3
Electives	8	Electives	10
	16		16
	THIRD YEAR		
Economics 15	3	Economics 32	3
Economics 38	4	Economics 39	4
Civil Engineering 20	2	Civil Engineering 21	2
Electives	7	Electives	7
	16		16

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FOURTH YEAR

Economics 36	3	Economics 16	2
Economics 37	3	Economics 36*a*	3
Economics 46	3	Economics 47	3
Mechanical Engineering 24	3	Civil Engineering 23	2
Civil Engineering 22	2	Electives	6
Drawing 12	2		
	16		16

Insurance

The following program is designed for the student who intends to enter the actuarial profession, either in life or casualty insurance, or who expects to undertake statistical work of an advanced nature. While the actuarial and mathematical phases of insurance are emphasized, it may be pointed out that the training thus secured frequently leads to other lines of official work, such as secretarial, managerial, and executive. The first two years of this program may be taken with profit by any student in business administration who desires to obtain a working knowledge of financial mathematics and its applications to business.

Students who have completed the first two years of the program in Accounting are prepared to take Course 48 in Insurance Accounting. This would fit them for responsible positions in various home office departments of insurance companies and state departments of insurance. It would not be necessary for them to take the advanced courses in Mathematics required of those intending to enter the actuarial profession.

Students taking the program in General Business or the program in Banking may fit themselves for similar positions by adding Mathematics 51 and 52 in the second year and Course 48 in Insurance Accounting in the third or fourth year.

For further information, students are advised to consult the professor in charge, 405 Mason Hall, and the special announcement of courses in financial, statistical, and actuarial mathematics.

FIRST YEAR

FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Electives	8	Electives	8
	15		15

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SECOND YEAR

Mathematics 51	3	Mathematics 52	3
Mathematics 3 or 3E	4 or 5	Mathematics 4 or 4E	4 or 5
Economics 1	5	Economics 2	3
Electives	3 or 2	Electives	5 or 4
	16		16

THIRD YEAR

Mathematics 53	3	Mathematics 54	3
Mathematics 49	2	Mathematics 50	2
Mathematics 13	3	Mathematics 14	3
Economics 38	4	Economics 39	4
Electives	4	Electives	4
	16		16

FOURTH YEAR

Mathematics 55	4	Mathematics 56	4
Mathematics 59	2	Mathematics 60	2
Mathematics 67	2	Mathematics 68	2
Economics 46	3	Economics 47	3
Electives	5	Economics 48	2
		Electives	3
	16		16

SUGGESTED COURSE OF STUDIES FOR STUDENTS WHO DESIRE TO PREPARE FOR MENTAL TESTING IN SOCIAL CLINICS

In the sophomore year, Philosophy 8*e* and 8*f*; in the junior year, Sociology 19 and 20, Philosophy 21, 25*c*; in the senior year and graduate years, Sociology 28 and 30, Philosophy 24*g*, and at least *eight hours* of research in special problems. In this connection opportunity will be offered for the inspection of and work in the charitable institutions in Detroit. It is recommended that students elect Mathematics 49 and 50 with the necessary preliminary courses, Philosophy 28 and 29, Sociology 23 and 23*a*. Students who have in mind preparation for work as employment manager should in addition elect courses in business administration and economics; those who prepare for positions in connection with city school systems and for vocational guidance should elect courses in education, particularly in educational psychology and administration. A master's degree is advisable for those who prepare for this work.

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CURRICULUM IN PHYSICS

Recent industrial development has been characterized by the application of Physics to many kinds of technical problems. Although the College of Literature, Science, and the Arts offers no special degree in Physics, the following outline is presented as meeting the needs of students who may wish to follow the profession of industrial physicist. The program may be varied somewhat widely according to the needs and tastes of the individual, and may readily be adapted to the requirements of prospective teachers. Upon the successful completion of the program as outlined the graduate will be prepared to practice his profession upon the same footing as the graduate chemist or engineer.

High school physics is a prerequisite for Physics 1, which must also be preceded or accompanied by a course in plane trigonometry. Students entering college with credit in preparatory physics may elect Physics 1 in the first year if they have credit in trigonometry, or if they elect Mathematics 1 at the same time. This procedure is strongly recommended. For those who enter college without preparatory physics, however, there is provided a course, Physics Z, which may be taken in the first year, and may be followed by Physics 1 either the second semester of the first year, or the first semester of the second year.

The program as outlined gives room for such elective studies as will satisfy the group requirements, for excellent preparation in mathematics, and for adequate attention to the cognate subjects, chemistry, astronomy, geology, and mineralogy. It cannot be too emphatically stated that mathematical equipment is necessary for success in physics. It must, however, be borne in mind that the viewpoints of these two sciences are somewhat apart, and that neither familiarity with mathematics nor interest in popular science will guarantee success in a subject so broad and so fundamental as physics.

The programs suggested for the undergraduate years are as follows. Electives and alternatives must be so chosen as to satisfy the group requirements for graduation (see page 138).

PROGRAM OF STUDIES

FIRST YEAR

FIRST SEMESTER		SECOND SEMESTER	
Courses	Hours	Courses	Hours
Rhetoric 1	3	Rhetoric 2	3
French or German	4	French or German	4
Mathematics 1	4	Mathematics 2	4
Physics 1	4	Physics 2	4
	15		15

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SECOND YEAR

Physics 5	4	Physics 6	4
Physics 1*a*	1	Physics 2*a*	1
Mathematics 3 or 3*E*	4 or 5	Mathematics 3 or 4*E*	4 or 5
Astronomy 1 or	3	Astronomy 2 or	3
Chemistry	4	Chemistry	4 or 5
History 1 or 1*a* or	4	History 2 or 2*a* or	4
Economics 1	5	Economics 2	3

An elective from the language group, a continuation perhaps of the language taken in the first year, may be substituted in this program, either for the Astronomy or Chemistry, or for the History or Economics. Physics 1*a* and 2*a* are suggested in case time is available.

THIRD YEAR

Courses	Hours	Courses	Hours
Physics 7	4	Physics 8	4
Mathematics 4*b*	4	Chemistry 3 or 8	4 or 5
Mathematics 57	2	Mathematics 58	2
Philosophy 1	3	Philosophy 9	3
German or French	4	German or French	4

Physics 9 and 10 may be taken instead of Mathematics 57 and 58.

FOURTH YEAR

Physics 9	2	Physics 10	2
Physics 23 or 25	4 or 2	Physics 12, 18, or 14	2
Mathematics 9	3	Mathematics 12	3
Mathematics 5 or 11	2 or 3	Physics 38	1
Physics 37	1	Electives	8
*Electives	4 or 6		

Physics 6, Economics 1, or a language may be taken the second semester.

Not more than sixteen hours a week may be elected except by special permission obtained from the Committee on Extra Hours in accordance with the rules of the College (see page 142).

CURRICULUM IN CHEMISTRY

The Curriculum in Chemistry has been devised for students registered in the College of Literature, Science, and the Arts who desire to prepare themselves for professional work in chemistry. The Board of Regents of the University, at their May meeting, 1914, authorized the preparation of a program of studies leading to the degree of Bachelor of Science in Chemistry. The requirements of the

* Students planning to specialize in Physics should confer with the members of the departmental faculty.

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College of Literature, Science, and the Arts in regard to admission, election of studies, grades, discipline, and graduation apply to students taking the curriculum in chemistry, except for some modifications of the group requirements. Students who complete either of the programs of study outlined below will satisfy the requirements for graduation leading to the degree of Bachelor of Science in Chemistry.

The degree of Master of Science in Chemistry will be conferred after a full year's graduate training in chemistry, following the completion of all requirements for the degree of Bachelor of Science in Chemistry.

Students intending to take the curriculum in chemistry should also enroll with the enrollment committee of the chemical faculty at the beginning of their University residence. This committee consists of Professors Smeaton, Willard, and Bartell. Students in their second, third, or fourth years of University residence may prepare themselves to become candidates for the degree of Bachelor of Science in Chemistry upon completing the required courses, or their equivalents, as outlined in the programs of study. Students in this course are advised to remain for at least one summer session during the period of University residence, to provide opportunity for more elective work than is permitted by the schedule of studies during the first three years. Those planning to go on with graduate work are urged to take such additional courses in French and German as will enable them to become thoroughly cognizant of the scientific literature in both these languages. They should also take additional courses in mathematics dealing with graphical methods.

PROGRAM OF STUDIES

I.

† Students entering without French, German, or Chemistry.

FIRST YEAR

FIRST SEMESTER	Hours	SECOND SEMESTER*	Hours
French 1 or German 1	4	French 2 or German 2	4
Rhetoric 1	3	Rhetoric 2	3
Mathematics 1	4	Mathematics 2	4
Chemistry 1	4	Chemistry 2	4
	15		15

† Students presenting two units of French or German for admission will take French or German 3 and 4 the first year and German or French 1 and 2 the second year.

* Students beginning chemistry the second semester must elect Chemistry 1b and follow this with either Chemistry 2b or 2E the first semester of the next year, or with Chemistry 2 in the summer session. The latter course is advised.

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	SECOND YEAR		
Physics 1	4	Physics 2	4
Mathematics 3*a*	3	Mathematics 4*a*	3
French or German	4	French or German	4
Chemistry 3	5	Chemistry 5	5
	16		16
	THIRD YEAR**		
Chemistry 7	5	Chemistry 7*a*	5
Chemistry 28	5	Chemistry 8	4
Elective—Group III	6	Chemistry 59	2
		Elective—Group III**	6
	16		17
	FOURTH YEAR		
Chemistry 13	4	Chemistry 15	2
Physics 5	4	Electives in Chemistry or Metallurgy	6
Technical Chemistry or Metallurgy	4	Elective	8
Elective	4		
	16		16

Students entering with one unit of Chemistry will take Chemistry 2*b* or 2*E*, followed by Chemistry 3, in the first year, Chemistry 5 and 28 the second year, and Chemistry 59 in the first semester of the third year.

General correspondence concerning the curriculum may be addressed to the Director of the Chemical Laboratory, The University, Ann Arbor. Inquiries concerning entrance requirements or credit for advanced work should be addressed to Dean J. R. Effinger, or to the Registrar.

CURRICULUM IN LANDSCAPE DESIGN

The Curriculum in Landscape Design is organized as a special program of study in the College of Literature, Science, and the Arts, and leads to a special degree (Master in Landscape Design). It requires a minimum of five years' college work. The program is as follows:

** Permission to elect 17 hours in the College of Literature, Science, and the Arts is granted to applicants for extra hours who have a record for superior scholarship.

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PROGRAM OF STUDIES

FIRST YEAR

FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
Rhetoric 1	3	Rhetoric 2	3
Foreign Language	4	Foreign Language	4
Mathematics 1	4	Botany 1	4
Geology 1*a*	3	Geology 6*a*	3
Drawing 21	2	Drawing 22	2

SECOND YEAR

Foreign Language or Botany 7)	4	Foreign Language (or Botany 26)	4
Surveying 1	3	Surveying 2	4
Drawing 23	2	Drawing 24	2
Landscape Design 1	3	Landscape Design 2	3
Landscape Design 3	3	Landscape Design 4	3

Summer Session at Camp Davis: Surveying 3, 8 hours.

THIRD YEAR

Political Science 3	3	Political Science 4	3
Drawing 4*a*	3	Architecture 4	3
Architecture 1	3	Architecture 21	2
Drawing 25	2	Landscape Design 6	3
Landscape Design 5 or 13	3	Landscape Design 14	3
Elective	2	Elective	1

FOURTH YEAR

	Hours		Hours
Civil Engineering 40	2	Civil Engineering 26	2
Drawing 26	2	Drawing 27	2
Landscape Design 7	4	Landscape Design 8	4
Landscape Design 5 or 13	3	Landscape Design 14	3
History	3	Landscape Design 16	2
Elective	3 or 4	Elective	3

FIFTH YEAR

Landscape Design 9	4	Landscape Design 10	6
Landscape Design 11	4	Landscape Design 12	6
Electives	4 or 6		

Students entering the course on advanced standing and others preparing for some special phase of the landscape profession may, by permission of the Professor in charge and at his discretion, substitute other courses of equivalent time value for some of those specified above.

The following courses are recommended as electives:

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Zoölogy 1 and 6
Botany 7, 13, 14, 17, and 23.
Mineralogy 1.
History 1, 2, 12, 16, and 17.
Physics 1 and 2.
Political Science 3 and 4.
Civil Engineering 41 and 43.
Geology 15 and 29.
Economics 1.
Fine Arts 1, 3, 5, 6, and 8.
Forestry 1, 2, 5, 20, 22, and 23.

Not more than sixteen hours a week may be elected except by special permission obtained from the Committee on Extra Hours in accordance with the rules of the College (see page 142).

The object of the curriculum is primarily to train professional landscape designers, and hence it includes lines of study which are essential to a liberal college education in addition to the technical studies. Courses 1, 2, and 5, in the department of Landscape Design are open to all students except freshmen.

No one will be allowed to complete all the courses in landscape design as an undergraduate. At least the last year of work must be taken as a graduate student.

The privilege of taking certain electives in the College of Engineering is granted to students enrolled in this program.

A special bulletin on the Curriculum in Landscape Design,, containing the required program and other information, may be obtained by addressing the Secretary of the University. Correspondence concerning the course may be addressed to Professor Aubrey Tealdi, The University, Ann Arbor. Inquiries concerning the requirements for entering the University, or for credit for advanced work, should be addressed to Dean J. R. Effinger, or to the Registrar.

Curriculum in Park Management

The following program is planned for the student who wishes to fit himself for the position of City and Country Park Superintendent, Estate Superintendent, of Landscape Construction Superintendent. It includes a balanced program in natural science, engineering, landscape design, and forestry.

PROGRAM OF STUDIES

FIRST YEAR

FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
Rhetoric 1	3	Rhetoric 2	3
Foreign Language	4	Foreign Language	4
Botany 1	4	Zoölogy 1	4
Drawing 21	2	Mathematics 1	4
Landscape Design 1	3		

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SECOND YEAR

Political Science 1	3	Political Science 2	3
Foreign Language	4	Landscape Design 2	3
Surveying 1	3	Surveying 2	4
Botany 13	3	Botany 14	3
Landscape Design 3	3	Landscape Design 4	3

THIRD YEAR

Geology 1	3	Geology 6*a*	3
Political Science 3	3	Economics 32	3
Zoölogy 7	4	Botany 8	4
Landscape Design 13	3	Landscape Design 6	4
Forestry 2	2	Landscape Design 14	3

FOURTH YEAR

Botany 17	4	Forestry 6	2
Forestry 9	4	Forestry 10	4
Landscape Design 7	4	Landscape Design 10	4
Landscape Design 9	4	Civil Engineering 26	2
		Civil Engineering 40	2
		Economics 34	2

CURRICULUM IN FORESTRY

The Curriculum in Forestry is organized as a special program of study in the College of Literature, Science, and the Arts, and leads to special degrees (Bachelor of Science in Forestry and Master of Science in Forestry). The requirements for the degree of Bachelor of Science in Forestry are stated on page 139. The prescribed curriculum there referred to is as follows:

PROGRAM OF STUDIES

Four-Year Curriculum

FIRST YEAR

FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
Rhetoric 1	3	Rhetoric 2	3
Botany 1	4	Zoölogy 1	4
Mathematics 1	4	Mathematics 2	4
Chemistry 1	4	Chemistry 2	4
		Forestry 22	1

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SECOND YEAR

Surveying 12	4	Surveying 13	4
Botany 13	4	Botany 14	4
Physics 1	4	Mineralogy 9	2
Mineralogy 1	4	Forestry 1	4
Forestry 2	2	Forestry 6	2

Summer Session at Camp Davis: Surveying 3, 8 hours.

THIRD YEAR

Forestry 5	4	Forestry 8	4
Forestry 7	4	Forestry 10	4
Forestry 13	3	Forestry 14	3
Forestry 4	2	Geology 15F	3
Geology 1E	3	Botany 24	2

FOURTH YEAR

Forestry 3	2	Forestry 16	2
Forestry 9	4	Forestry 18	2
Forestry 15	4	Forestry 20	3
Forestry 19	3	Economics 1E	3
Botany 17	4		

Not more than sixteen hours a week may be elected except by special permission obtained from the Committee on Extra Hours in accordance with the rules of the College (see page 142).

Master of Science in Forestry

Men intending to become candidates for the degree of Master of Science in Forestry should consult with the faculty of Forestry immediately upon entering the University, so that their program of studies may be properly arranged at the very beginning.

There are two main classes of such forestry students:

(A) Those who enter this University as undergraduates with the intention of taking the degree of Bachelor of Science in Forestry at the end of their fourth year, and the degree of Master of Science in Forestry at the end of the fifth year.

(B) Those who begin the study of forestry as graduate students (except candidates for the doctorate). Such students require two years to complete the course in forestry, and receive the degree of Master of Science in Forestry.

In addition to the above, there are two other classes of forestry students:

(C) Candidates for the doctorate (Doctor of Philosophy or Doctor of Science) may elect one or both minors in forestry.

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(D) Special students will be admitted to the work in forestry provided they have training and experience sufficient to warrant their taking any of the forestry courses.

A special bulletin describing the curriculum in forestry, and containing the required program and other details, may be obtained by addressing the Secretary of the University. General correspondence concerning the curriculum may be directed to the Professor of Forestry, The University, Ann Arbor. Inquiries concerning entrance requirements or credit for advanced work should be addressed to Dean J. R. Effinger, or to the Registrar.

Important Notice

Students entering the College of Literature, Science, and the Arts with intention of taking the Curriculum in Forestry should inform the committee on Elections of that intention, in order that their election of studies may be made in accordance with the prescribed program given above.

All Forestry students entering the University with advanced standing and those transferring from some other course to that of Forestry, should consult the faculty of the department of Forestry before making their elections.

The Curriculum in Forestry is prescribed throughout, and must be taken in order given above. No deviations may be made from this order except by written permission of the Professor of Forestry.

Before making elections each semester, all Forestry students should consult with a committee of the Forestry faculty appointed for that purpose.

TEACHER'S DIPLOMA AND TEACHER'S CERTIFICATE

The aims of the University in providing instruction in Education are as follows:

1. To fit the University student for the higher positions in the public school service.

2. To promote the study of education as a science.

3. To teach the history of education, and of educational systems and doctrines.

4. To secure to teaching the rights, prerogatives, and advantages of a profession.

5. To give a more perfect unity to our State educational system by bringing the secondary schools into closer relations with the University.

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Teacher's Diploma

The Teacher's Diploma is given to a student in connection with his bachelor's degree, provided he has taken eleven hours in Education, including course *4a, b, c, d, e, f, g, h,* or *i.*

The diploma is also given to a graduate student at the time of receiving a master's or a doctor's degree, provided he has pursued teaching as a major or a minor study, or has otherwise satisfactorily completed an equivalent amount of pedagogical work.

Teacher's Certificate

By authority of an act of the State Legislature, passed in 1891 and amended in 1903, the Board of Regents, acting upon the recommendation of a Faculty of this College, gives a Teacher's Certificate to any person who takes a bachelor's, master's, or doctor's degree, and also receives a Teacher's Diploma as provided above. By the terms of the act, the certificate given by the Regents "shall serve as a legal certificate of qualification to teach in any of the schools of this State, when a copy thereof shall have been filed or recorded in the office of the legal examining officer or officers of the county, township, city, or district."

TEACHER'S APPOINTMENT COMMITTEE

An appointment committee representing the Faculty of the College of Literature, Science, and the Arts has been constituted for the purpose of assisting men and women who are studying, or have studied, under this Faculty, to secure positions as teachers. This service is performed gratuitously, in the interest of students of the University, past or present, and of superintendents of schools and boards of education wishing to employ teachers. Persons desiring to reach this committee should address their communications to the Secretary of the Appointment Committee, The University.

SCHOLARSHIPS, LOAN FUNDS, AND PRIZES

A large number of fellowships, scholarships, and loan funds exist, which are described on pages 103 to 114. None of these are open to students in the first year of residence, except the Phillips Scholarship. These are won by competitive examinations in Greek and Latin, and these studies must be continued for at least one year in the University.

The Good Government Club Prize and the Michigan Menorah Society Prize are described on page 114, while various oratorical and debating prizes are described on pages 87 to 89.

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FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no student can enter upon his work until after such payment. For the rules governing Second Semester Fees and the refunding of fees, see page 117.

MATRICULATION FEE.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *eighty dollars* for men; *seventy-six dollars* for women; for all others, *one hundred five dollars* for men; *one hundred one dollars* for women.

The fee for the second semester is sixty per cent of that for the entire year.

PART TIME FEE.—Persons engaged in teaching in public, parochial, or private schools who are regularly admitted as students in the College of Literature, Science, and the Arts, may elect not more than five hours a week, upon the payment of a fee of *ten dollars,* in lieu of the regular annual fees. Such students must pay the matriculation fee the same as other students.

LATE REGISTRATION.—Registration (i. e. enrollment, payment of fees, and classification) must be entirely completed before the first day of the semester. Students failing to complete their registration before the first day of each semester are required to pay a late registration fee of five dollars.

GRADUATION FEE.—For all alike, *ten dollars.*

TEACHER'S DIPLOMA FEE.—For all alike, *two dollars.*

BUSINESS ADMINISTRATION CERTIFICATE FEE.—For all alike, *two dollars.*

LABORATORY DEPOSITS.—Students who pursue laboratory courses in Chemistry, Bacteriology, and Hygiene are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance range from one to twenty dollars. Otherwise no extra fee is charged for laboratory courses.

The laboratory deposit must in all cases be paid to the Treasurer of the University before the students may enroll in the class.

GYMNASIUM FEE.—For the rental of a locker in the Gymnasium a fee of two dollars is charged for men, one dollar for women.

For additional information in regard to expenses, see page 115.

COURSES OF INSTRUCTION

The Courses of Instruction are subject to change from time to time. From the courses offered in the various branches of learning, the student is allowed to make his choice, under regulations prescribed by the Faculty (see page 141).

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The courses announced for the year 1920-1921 are described below. Those to be offered in 1921-1922 may be expected to differ but slightly from those given here. The amount of credit toward graduation assigned to each course is indicated by the expression *one hour, two hours,* etc.

Immediately following the name of the department is stated the group in which the courses in that department fall in accordance with the requirements for graduation (see page 138).

COURSES IN OTHER SCHOOLS AND COLLEGES

OPEN, UNDER CERTAIN CONDITIONS, TO STUDENTS IN THE COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS

Certain courses, given in other Schools and Colleges of the University, may be elected by students in the College of Literature, Science, and the Arts. For the detailed description of such courses, see the Announcements of those Schools and Colleges.

Students in this College may elect courses in other Schools and Colleges of the University only by special permission of the Dean of this College. (See below.) Such permission is granted *pro forma* to students enrolled in programs (Business Administration, Forestry, etc.) whose curricula include courses outside the College. But students who relinquish such special programs forfeit the credit for extra-Collegiate courses they may have taken.

Courses in the Medical School or the Law School thus taken may not be counted towards the hours of Literary credit required for the Combined Curricula.

The only courses which may be elected without the special permission of the Dean are described in the following pages.

Anatomy

(See Medical Sciences)

Arabic

(See Semitics)

Aramaic

(See Semitics)

Assyrian

(See Semitics)

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ASTRONOMY

(GROUP II)

Courses 1, 2, 2*a*, 8, and 8*a* are intended to furnish a general knowledge of Descriptive Astronomy without entering far into its mathematical details. Courses 3, 5, 9, and 18 are beginning courses in the departments of Spherical and Practical Astronomy, Mathematical Astronomy, Astrophysics, and Solar Physics, respectively.

CONSULTATION HOURS.—Throughout registration week, September 20 to 26, Professor HUSSEY, or a representative, will be in his office at the Observatory, 11 to 12 daily, to advise those desiring to elect courses in Astronomy.

FIRST SEMESTER

1. Descriptive Astronomy. The Solar System. *Three hours credit.* Professors HUSSEY and CURTISS.
   A descriptive course, including the fundamental principles of Astronomy, and a presentation of the leading facts respecting the sun, moon, planets, and comets. Occasional lantern illustrations, with visits to the Observatory.

3*e*. Geodetic Astronomy. *Two hours credit.* Professor CURTISS and Assistant Professor RUFUS.
   The elements of General, Spherical, and Geodetic Astronomy, with practical applications. Theory of the determination of time, latitude, longitude, and azimuth.

4. Practical Astronomy. *Two hours credit.* Recitations, and observational work at the Observatory. Professor HUSSEY, and Mr. ROSSITER.
   Studies in Spherical Astronomy. Theory of the meridian circle and equatorial and their use in observational work. Reduction of observations. Open to those who have had Course 3, or 3*e*, or an equivalent.

5. Theoretical Astronomy. *Three hours credit.* Professor HUSSEY.
   The elements of Celestial Mechanics, and theory and practice in the determination of parabolic and elliptic orbits. This course presupposes a knowledge of integral calculus.

8. History of Astronomy. *Two hours credit.* Assistant Professor RUFUS.
   The history of Astronomy from the dawn of the science, treating especially of its modern development, its relation to the history of science in general, and its contribution to the progress of civilization. A knowledge of Descriptive Astronomy is required.

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11. Variable Stars. *Two hours credit.* Professor CURTISS.
Lectures at the University and observational studies of selected stars at the Observatory. A knowledge of Descriptive Astronomy is required.

12. Spectroscopic Binaries. *Two hours credit.* Professor CURTISS.
Theory and practice in the determination of orbits from spectroscopic measurements of motion in the line of sight, and from photometric observations of variations in brightness. Calculus is required.

14. Advanced Mathematical Astronomy. Studies in continuation of Course 7 will be arranged for those qualified to take them. *Three hours credit.* Professor HUSSEY.

18. Solar Physics. *Two hours credit.* Assistant Professor RUFUS.
A study of the methods and instruments used in modern solar research. Discussion of results of recent investigations. Lectures and collateral reading. Calculus and General Physics are required.

21. Advanced Physical Astronomy. *Hours and credit to be arranged.* Professor CURTISS and Assistant Professor RUFUS.
Studies in continuation of Courses 9 and 18 will be arranged for those qualified to take them.

SECOND SEMESTER

2. Descriptive Astronomy. Stars and Nebulae. *Three hours credit.* Professors HUSSEY and CURTISS.
A general descriptive course in Stellar and Nebular Astronomy. Occasional lantern illustrations. May be taken in continuation of Course 1, or independently, as desired.

2*a*. Elementary Observational Astronomy. *One hour credit.* Assistant Professor RUFUS.
Constellation studies and telescopic examinations of the heavenly bodies. Selected problems with the celestial globe and the equatorial telescope. Observational work at the Observatory. To be preceded by Course 1, or to be taken in connection with Course 2 or Course 3*e*.

3. Spherical and Practical Astronomy. *Two hours credit.* Assistant Professor RUFUS.
The elements of Spherical and Geodetic Astronomy, with practical applications. Theory of the sextant and astronomical transit, and practice in the determination of time, latitude, longitude, and azimuth.
This course will be accepted as an equivalent of Course 3*e* for Engineering students.

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3*e*. Geodetic Astronomy. *Two. hours credit.* Assistant Professor RUFUS.

The elements of General, Spherical, and Geodetic Astronomy, with practical applications. The theory of the determination of time, latitude, longitude, and azimuth.

4. Practical Astronomy. *Two hours credit.* Professor HUSSEY.

Open to those who have had Course 3 or its equivalent. See announcement for first semester.

6. Method of Least Squares. *Two hours credit.* Assistant Professor RUFUS.

Theory of the error curve and of the combination of observational data according to the Method of Least Squares.

7. Advanced Theoretical Astronomy. *Three hours credit.* Professor HUSSEY.

Definitive determination of orbits. Theory of Interpolation and Mechanical Quadrature. Special Perturbations. Open to those who have had Course 5.

8*a*. The History of Astronomy in America. *Two hours credit.* Assistant Professor RUFUS.

A study of the progress of the science in the United States, dealing especially with contributions of American astronomers. For undergraduates who have completed Course 8, and for graduates.

9. Astrophysics. *Two hours credit.* Professor CURTISS.

Introductory Course. General treatment of methods and results, having reference more particularly to stellar spectroscopy. Practice in the measurement and reduction of spectrographic plates will form a part of the course. A general knowledge of Physics, Astronomy, and Calculus is required.

12. Spectroscopic Binaries. *Two hours credit.* Professor CURTISS.

Continued from the first semester.

14. Advanced Mathematical Astronomy. See announcement for first semester. Professor HUSSEY.

21. Advanced Physical Astronomy. See announcement for first semester. Professor CURTISS, and Assistant Professor RUFUS.

22. Navigation. *Three hours credit.* Professor CURTISS.

The principles of Pilotage, Dead Reckoning, and Nautical Astronomy. Lectures based on Bowditch's *American Practical Navigator,* supplemented by practical problems, chart exercises, and sextant observations.

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SUMMER SESSION OF 1921

1*s*. Modern Astronomy. The Solar System. *Two hours credit.* Professor HUSSEY.

2*s*. Modern Astronomy. The Stars and Nebulae. *Two hours credit.* Professor CURTISS.

3 or 3*e*. Practical Astronomy. *Two hours credit.* Assistant Professor RUFUS.
Research work.

Bacteriology

(See Medical Sciences)

BIOLOGY

Courses 1 and 2 in General Biology are no longer given as such. In place of General Biology, students should elect Zoölogy 1 and Botany 1 or 1*a*, which must be taken in successive semesters. These courses should, if possible, be taken during the student's first year of residence. For regulations concerning their election, see the descriptions under the departments of Zoölogy and Botany, respectively.

First year students should not elect Zoölogy and Botany at the same time. To complete a year's work in Biology they should elect either Zoölogy or Botany in the first semester, and must then elect in the second semester the subject not taken in the first. Students who expect to take Zoölogy 1, Botany 1 or 1*a*, and Organic Chemistry 10, all in one year (the second), should elect Zoölogy in the first semester and Botany and Organic Chemistry in the second semester. Students who are not in their first year may elect both Zoölogy and Botany in the same semester.

The attention of students who propose eventually to take up the study of medicine is called to the announcement of the Combined Curriculum in Letters and Medicine, leading to the degrees of Bachelor of Arts and Doctor of Medicine, given on page 146.

BOTANY

(GROUP II)

The department of Botany occupies the south side of the new Natural Science building. The easiest approach from the interior of the Campus is by the easterly one of the two south entrances.

CONSULTATION HOURS.—Representatives of the Botanical staff will be in Room B 209, 10 to 12 daily, throughout registration week, for consultation with students.

First semester electives: Courses 1, 1*a*.

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Second semester electives: For those with no college botany, Courses 1, 1*a*; for those with one semester of college botany, Courses 4, 8, 18, 26.

Second year electives: Courses 3, 4, 6, 7, 8, 9, 13, 14, 16, 18, 25, 26.

Upper class electives: The courses with higher numbers than in the three foregoing classes require at least two years of college botany to precede. Other conditions will be found accompanying the individual courses.

Advice to Students:

1. Students having done a year's high school work in botany may be admitted to Course 1*a*.

2. Those preparing for teaching in the secondary schools should take Courses 1 or 1*a*, 3, 4, 6, 7 or 26, 8, 15 and 15*a*, 16 or 18, 27. No one can be considered for recommendation for teaching without Courses 1, 7 or 26, and 8.

Considerable demand has arisen for teachers of school gardening. Those desiring to prepare for such positions should attend the Summer Session and take a teacher's course in gardening and a course in agricultural botany.

3. Those preparing for professional forestry are advised to take Courses 1 or 1*a*, 13, 14, 17, 22, 23, 25, and 26.

4. Those preparing for professional work in plant pathology should take Courses 1 or 1*a*, 4, 6, 7, 8, 15, 19 and 20, 19*a* or 20*a*, and some problem in pathological research.

5. Those preparing for college positions should take the courses enumerated in group 3, 4, or 5 above, and in addition a problem in the direction of the specialty chosen.

6. Those desiring to prepare for civil service examinations for Government service in the U. S. Department of Agriculture should consult the instructors in botany.

FIRST SEMESTER

1. Elements of Botany. *Four hours credit.* Two lectures, one quiz, and six hours laboratory work each week. Assistant Professor TUPPER, Professors DAVIS, POLLOCK, and BARTLETT, and Mr. GUSTAFSON, Mr. LARUE, and assistants.

A study will be made of the properties and activities of protoplasm, developmental history, evolution of structure and function, relation to environment, and the classification of forms into the groups which make up the plant kingdom. The course will begin with a study of the cell and cell structure of the

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higher plants and the relation of this structure to function. Then a series of plants will be studied from the simplest algae and fungi to liverworts, mosses, ferns, and seed plants.

This course is a prerequisite for all other laboratory courses in Botany except 1*a*. Course 1 is repeated and is open for general election the second semester. Students planning to take Botany 1, Zoölogy 1, and Organic Chemistry 10, all in one year, will find a conflict in lecture hours between the Zoölogy and Chemistry, and hence should take the Botany and Chemistry in the second semester.

1*a*. Elements of Cryptogamic Botany. Lectures, laboratory, and quiz. *Four hours credit.* Professor KAUFFMAN.

This course is taken in place of Botany 1 by those who have had a year of standard high school botany or its equivalent.

1*p*. Elementary Structural Botany. *Two hours credit.* Lectures and laboratory work. Assistant Professor EHLERS.

This course is primarily for pharmacy students; literary students will be admitted by special permission only.

3. Microbiology of Soil, Air, Water, and Food. *Two hours credit.* Professor POLLOCK.

A study of some of the more common organisms in our immediate environment, their identification and their relation to human welfare and industrial processes, organisms concerned in soil fertility, the fermentation industries, good preparation and preservation.

The course must be preceded by Botany 1 or 1*a*.

3*a*. Microbiology. Advanced Course. *Two or more hours credit.* Professor POLLOCK..

7. Plant Physiology. *Four hours credit.* Professor NEWCOMBE.

This course is a study of the culture, nutrition, growth, reproduction, and behavior of plants.

This course and Course 8 in the second semester are planned as a year's work for second year students; and these two courses, with the first year's work, are intended to give a general survey of the science of general botany. These two courses are required to precede, except as specifically stated, all third and fourth year courses. Either Course 7 or Course 26 fulfills the requirements in plant physiology.

7*a*. Experimental Physiology. Advanced Course. *Three or more hours credit.* Professor NEWCOMBE.

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[9. Cell Structure, Tissue Differentiation, and Methods of Botanical Microtechnique. *Four hours credit.* Professor DAVIS.
Prerequisite: Botany 1 or 1*a*; Courses 7 and 8 recommended to precede.
This course considers the structure and activities of the plant cell, and the principles of tissue development and differentiation. A feature of the laboratory work is practice in methods of fixing, staining, and sectioning of plant tissue. Offered in alternate years; omitted in 1920-1921.]

13. Forest Botany. *Four hours credit.* Lectures, field and laboratory work. Field and laboratory work, *eight hours a week.* Assistant Professor EHLERS.
This course must be preceded by Course 1 or 1*a*.
The work of this course will consist of the study of the external morphology, the identification and classification, and the biology of the trees, shrubs, and herbaceous plants of the forest societies. By the requirement of field notes, and laboratory notes and drawings, students will have practice in the methods of descriptive botany and dendrology.

15. Genetics. *Three hours credit.* Professors SHULL and BARTLETT.
This course gives a comprehensive view of the subjects of heredity and variation. The student is given an opportunity to become familiar with the genetical investigations in progress in both the departments of Zoölogy and Botany, as for example, sex determination in rotifers and insects, complicated Mendelian phenomena in Drosophila, mutation and hybridization phenomena in Oenothera, and practical plant breeding projects.
Open to graduates and to qualified undergraduates. Students in sociology and prospective medical students who have had some training in biology will find that this course affords a basis for the understanding of human heredity.
Courses 15 and 15*a* form a continuous year's work. Those who elect Course 15 should, if possible, elect Course 15*a* in the second semester.

17. Forest Mycology and Pathology. *Four hours credit.* Professor KAUFFMAN.
This course is primarily for students intending to study forestry. Special attention will be paid to those fungi causing diseases of trees and decay of wood.

19. Advanced Mycology and Pathology. Conferences, readings, field and laboratory work. *Three, five, or eight hours credit.* Professor KAUFFMAN.
This course deals with the special morphology, identification, and classification of fungi, and the study of their literature. It is necessary as a basis for research in fungi. It will be

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especially useful for students who wish to prepare for positions in Experiment Stations or in the U. S. Government work. It must be preceded by Course 6 or its equivalent, and should be followed by Courses 20, 49, and 50.

19*a*. Seminary in Mycology. *One hour credit.* Professor KAUFFMAN. Admission by permission of the instructor.

23. Agrostology. *Two hours credit.* Laboratory, field, and herbarium work, with conferences. Assistant Professor EHLERS.
A course in the study and identification of grasses and sedges, especially adapted to meet the needs of those preparing for the Government surveys of forests and grazing lands.

[25. Phytogeography of North America. Lectures and assigned reading. *Two hours credit.* Professor BARTLETT.
This course deals with the historical and environmental factors determining the geographical distribution of plants. Each student is required to write a thesis upon an assigned topic, generally a correlation between the native flora and the agriculture of one of the phytogeographic regions. The introductory lectures take up the history of botanical exploration in North America. To be preceded by Botany 4, 13, or 104. Given in alternate years. Omitted in 1920-1921.]

27. Plant Cytology. *Four hours credit.* Professor DAVIS.
Prerequisites: Botany 7, 8, 9, and 15.
This course, together with Course 30, treats of the organization and behavior of protoplasm at critical periods in the life histories of plants. The work of the first semester includes a study of chromosome reduction and segregation in the process of pollen formation and in the development of the embryo sac. Offered in alternate years.

29. Botanical Reading in French. *One hour credit.* Professor LEE.

33. Current Literature of Botany. *One hour credit.* Professor NEWCOMBE.
Course 33 constitutes a Journal Club in which important papers on Botany are reviewed and discussed by the instructors and advanced students. All students are admitted to the meetings, but only advanced students may elect the course.

39. Investigation in the Classification and Distribution of Special Groups of Flowering Plants. This work may be elected for *three or more hours credit.* Assistant Professor EHLERS.

41. Investigations in Physiology. This work may be elected as 41*a*, *three hours credit;* 41*b*, *five hours;* 41*c*, *eight hours;* 41*d*, *ten hours.* Professor NEWCOMBE.

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43. Investigations in the Role of Fungi in Soil Biology. This work may be elected as 43*a*, *three hours credit;* 43*b*, *five hours;* 43*c*, *eight hours;* 43*d*, *ten hours.* Professor POLLOCK.

45. Investigations in the Bacterial Diseases of Plants. This work may be elected as 45*a*, *three hours credit;* 45*b*, *five hours;* 45*c*, *eight hours;* 45*d*, *ten hours.* Professor POLLOCK.

47. Investigations in Cytology and Genetics. This work may be elected as 47*a*, *three hours credit;* 47*b*, *five hours;* 47*c*, *eight hours;* 47*d*, *ten hours.* Professor DAVIS.

49. Investigations in Mycology and Pathology. This work may be elected as 49*a*, *three hours credit;* 49*b*, *five hours;* 49*c*, *eight hours;* 49*d*, *ten hours.* Professor KAUFFMAN.

51. Investigations in the Physiology of Reproduction in Algæ, Mosses, or Ferns. This work may be elected as 51*a*, *three hours credit;* 51*b*, *five hours,* 51*c*, *eight hours;* 51*d*, *ten hours.* Professor KAUFFMAN.

53. Investigations in Genetics and Biochemistry of Plants. This work may be elected as 53*a*, *three hours credit;* 53*b*; *five hours;* 53*e*, *eight hours;* 53*d*, *ten hours.* Professor BARTLETT.

SECOND SEMESTER

1. Elements of Botany. *Four hours credit.* Two lectures, one quiz, and *six hours laboratory work a week.*
This is a repetition of Course 1, first semester. See the announcement of that course for details.
Lectures for all sections. Professor POLLOCK.

2*p*. The Microscopy of Foods, Drugs, and Spices. *Three hours credit.* Assistant Professor GLOVER and assistants.

2*pa*. Advanced Microscopy of Foods, Drugs, and Spices. *Two or four hours credit.* Assistant Professor GLOVER and assistants.
This course is intended for those fitting themselves to be food or drug analysts.

4. Systematic Botany. *Two hours credit.* Laboratory and field work. Assistant Professor EHLERS.
A study of the local flora, giving training in the technique of identification and classification of plants.
This course must be preceded by Course 1 or Course 1*a*.

6. Mycology and Pathology. Lectures, field and laboratory work. *Four hours credit.* Professor KAUFFMAN.
To be preceded or accompanied by Courses 1 or 1*a*, and 7 or 8.
This course aims at a general introduction to the morphology,

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physiology, and classification of fungi, together with their artificial cultivation and their relation to disease. It is adapted to students in general botany, to teachers, and to those preparing to specialize in pathology. It should be followed by Courses 19 and 20.

8. Comparative Morphology of Plants. *Four hours credit.* Professor DAVIS.
Prerequisite: Botany 1 or 1*a*.
This is a study of the morphology and life histories of representative types and gives a basis for discussion of the relationships and the probable evolution of the chief groups of plants. The fungi receive a less proportionate degree of attention, since their structure and evolution is considered in Course 6.

10. Principles and Practice in State and Federal Plant Inspection. Lectures, field and laboratory work. *Three hours credit.* To be preceded or accompanied by Course 6. Professor KAUFFMAN.

[12. Microscopy of Potable and Polluted Waters. *Two hours credit.* Professor POLLOCK.
This course is primarily for students in sanitary engineering. It is intended to give a knowledge of the organisms frequently found in water supplies, giving them bad tastes or odors, as well as a knowledge of those organisms which are concerned in the purification of polluted waters or of sewage. Students will learn to recognize the commoner organisms concerned in these processes, and to understand how their biological activities are related in pollution and purification.
Omitted in 1920-1921.]

14. Forest Botany. Continuation of Course 13. *Four hours credit.* Lectures, field and laboratory work. Assistant Professor EHLERS.
The first part of the semester will be spent in the study of the development, structure, and function of the tissues of woody plants. The last part of the semester will resume the outdoor study of forest plants.

15*a*. Genetics. *Three hours credit.* Professors SHULL and BARTLETT.
A continuation of Course 15.

[16. Morphology, Physiology, and Classification of Liverworts, Mosses, and Ferns. Lectures, field and laboratory work. *Three hours credit.* Professor KAUFFMAN.
To be preceded or accompanied by Course 7 or 8. Given in alternate years.
Course 16 deals with the identification of the Archegoniates and the biological facts and theories which they illustrate. Omitted in 1920-1921.]

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[18. The Biology of the Fresh Water Algæ. Lectures, field and laboratory. *Three hours credit.* Professor KAUFFMAN.
This course deals with the special morphology, the biological significance, and the classification of the fresh water algæ. To be preceded by Botany 7 and 8. Omitted in 1920-1921.]

20. Advanced Mycology and Pathology. Conferences, readings, field and laboratory work. *Three, five,* or *eight hours credit.* Professor KAUFFMAN.
See Course 19, of which this may be made a continuation.

20*a*. Seminary in Mycology. *One hour credit.* Professor KAUFFMAN. Admission only by permission of the instructor.

22. Comparative Anatomy of Vascular Plants. *Three or five hours credit.* Chiefly laboratory work. Assistant Professor TUPPER.
Prerequisites: Botany 4, and either 8 or 14.
A comparative study of the internal structures of the vascular plants, with emphasis upon the characters of value in identification, classification, and wood technology.

26 Experimental Physiology. *Four hours credit.* Professor NEWCOMBE.
A study of the relation of plants to their environment as manifested by the phenomena of nutrition, growth, and irritability.
To be preceded by at least one semester of college botany. This is a more technical course than Course 7, but is not open to students who have passed Course 7.

26*a*. Experimental Physiology. Advanced course. *Three or more hours.* Professor NEWCOMBE.

28. Plant Cytology, continued. *Four hours credit.* Lectures and laboratory work. Professor DAVIS.
A continuation of the field of study opened by Course 27, and requiring that course as a prerequisite. During the second semester the lectures consider such subjects as spermatogenesis, oögenesis, fertilization, apogamy, apospory, determination of sex, xenia, hybridization, etc. The laboratory work illustrates certain features of the lecture program. Offered in alternate years.

[30. Geological History of Plants. Lectures, assigned reading, and demonstrations. *Two hours credit.* Professor BARTLETT and Assistant Professor TUPPER.
A survey of the literature of paleobotany and a summary of the evidences with regard to the phylogeny of the plant groups.

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Students will be given an opportunity to become acquainted with the technique used in the investigation of the minute structure of coal and other plant fossil material. To be preceded by Botany 4 and 8.
Omitted in 1920-1921.]

[32. Biochemistry of Plants. *Three hours credit.* Professor BARTLETT. A survey of the compounds elaborated by plants, from the standpoint of plant physiology. Prerequisites: Botany 7 or 26, 8 and organic chemistry. Offered in alternate years. Omitted in 1920-1921.]

34. Current Literature of Botany. Continuation of Course 33. *One hour credit.* Professor NEWCOMBE.

36. Botanical Readings in German. *One hour credit.* Professor LEE.

40. Investigations in the Classification and Distribution of Special Groups of Flowering Plants. *Three or more hours credit.* Assistant Professor EHLERS.

42. Investigations in Physiology. This work may be elected as 42*a*, *three hours credit;* 42*b*, *five hours;* 42*c*, *eight hours;* 42*d*, *ten hours.* Professor NEWCOMBE.

44. Investigations in the Role of Fungi in Soil Biology. This work may be elected as 44*a*, *three hours credit;* 44*b*, *five hours;* 44*c*, *eight hours;* 44*d*, *ten hours.* Professor POLLOCK.

46. Investigations in the Bacterial Diseases of Plants. This work may be elected as 46*a*, *three hours credit;* 46*b*, *five hours;* 46*c*, *eight hours;* 46*d*, *ten hours.* Professor POLLOCK.

48. Investigations in Cytology and Genetics. This work may be elected as 48*a*, *three hours credit;* 48*b*, *five hours;* 48*c*, *eight hours;* 48*d*, *ten hours.* Professor DAVIS.

50. Investigations in Mycology and Pathology. This work may be elected as 50*a*, *three hours credit;* 50*b*, *five hours;* 50*c*, *eight hours;* 50*d*, *ten hours.* Professor KAUFFMAN.

52. Investigations in the Physiology of Reproduction in Algæ, Mosses, or Ferns. This work may be elected as 52*a*, *three hours credit;* 52*b*, *five hours;* 52*c*, *eight hours;* 52*d*, *ten hours.* Professor KAUFFMAN.

54. Investigations in Genetics and Biochemistry of Plants. This work may be elected as 54*a*, *three hours credit;* 54*b*, *five hours;* 54*c*, *eight hours;* 54*d*, *ten hours.* Professor BARTLETT.

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SUMMER SESSION OF 1921

For Undergraduates.

1. Elements of Botany. *Four hours credit,* or *one unit for entrance.* Professor DAVIS and Mr. GUSTAFSON.

For Graduates and Undergraduates.

3. Microbiology of Soil, Air, Water, and Food. *Two to four hours credit.* Professor POLLOCK.

3*a*. Microbiology. *Two or four hours credit.* Professor POLLOCK.

2*s*. Algæ, Liverworts, Mosses, and Ferns. *Four hours credit.* Professor KAUFFMAN.

20. Advanced Mycology, and Pathology. *Three or six hours credit.* Professor KAUFFMAN.

6*s*. Mycology and Plant Diseases. *Four hours credit.* Professor KAUFFMAN.

5*s*. Systematic Botany. *Two hours credit.* Mr. GUSTAFSON.

For Graduates.

42, 44. Research in Physiology, Soil Biology, and Nutrition of Soil Fungi. *Four, six or eight hours credit.* Professor POLLOCK.

47. Investigations in Cytology and Genetics. *Credit to be arranged.* Professor DAVIS.

50. Research in Plant Pathology. *Four, six, or eight hours credit.* Professor KAUFFMAN.

52. Research in Mycology. *Four, six, or eight years credit.* Professor KAUFFMAN.

For the description of the courses in Zoölogy and Botany to be given at the Biological Station at Douglas Lake, Cheboygan County, see the chapter on the Summer Session.

Business Administration

(See Economics)

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CHEMISTRY

(Group II)

Students who expect to specialize in Chemistry are urged to follow, as far as possible, the sequence of studies in chemistry and related subjects as given in the "Curriculum in Chemistry." A special bulletin describing this curriculum may be obtained from the Registrar or from the Director of the Chemical Laboratory, Room 220, Chemistry Building.

The courses numbered 1 to 12 give work upon the foundation of chemistry in its several divisions. A sufficient number of these courses must be completed before entering upon the advanced studies of the science, or its special application to the industries and professions. Of the more advanced studies, Courses 13 to 26, inclusive, are in General, Inorganic, and Physical Chemistry; Courses 27 to 40, inclusive, in Analytical Chemistry; Courses 41 to 50, inclusive, in Organic Chemistry; Courses 51 to 60, inclusive, in Industrial and Engineering Chemistry. Other courses* in Technical Chemistry are announced by the department of Chemical Engineering.

CONSULTATION HOURS.—Throughout registration week, September 20 to 26, Professor SMEATON will be in Room 474, Ch., 10-12 daily, to advise those desiring to elect courses in chemistry.

FIRST SEMESTER

Foundation Courses in Chemistry:

1. General and Inorganic Chemistry. *Four hours credit.* Deposit, $5. Lectures, recitations, and laboratory work. Professor BIGELOW and assistants.

Students electing Course 1 are expected to elect Course 2 the following semester, as these form one complete whole and should properly be considered one course extending throughout the year. All elections, including those of upperclassmen, must be made through the classification committee.

2*b*. General and Inorganic Chemistry. *Four hours credit.* Deposit, $5. Lectures, recitations, and laboratory work. Professor SMEATON and assistants.

This course is for students who have had chemistry, but not the full equivalent of Courses 1 and 2. An examination will be held within the first four weeks and those considered inadequately prepared will be transferred to Course 1. All elections, including those of upperclassmen, must be made through the classification committee.

* Election of these other courses is subject to the rule governing the election of studies in other colleges.

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A. General and Inorganic Chemistry. *Six hours credit.* Deposit, $5. Lectures, recitations, and laboratory work. Professor LICHTY and assistants.

Course A is required of all first year students in the Colleges of Pharmacy and Dental Surgery. Others may elect the course only by special permission.

2E. General and Inorganic Chemistry. *Five hours credit.* Deposit, $5. Lectures, recitations, and laboratory work. Dr. HODGES and assistants.

Course 2E is required of all first year students in the College of Engineering who have presented entrance chemistry. Others may elect the course only by special permission.

3. Qualitative Analysis. *Five hours credit.* Deposit, $10. Recitations and laboratory work. Assistant Professor CARNEY, Mr. MCALPINE, and Mr. COLE.

Students who have completed Course 2 or 2*b* with the grade D may not elect Course 3 at all. Students who may not elect Course 3 must elect Course 3*a*, and follow this with Course 3*b*, before taking Course 5.

3*a*. Qualitative Analysis. *Four hours credit.* Deposit, $10. Recitations and laboratory work. Mr. SOULE.

Course 3*a* is not a complete course in itself, and it must be followed by 3*b* before higher courses in Analytical Chemistry are taken. Course 3*a* must be preceded by 2 or 2*b*.

3*b*. Qualitative Analysis *Four hours credit.* Deposit, $10. Recitations and laboratory work. Mr. COLE.

Course 3*b* must be preceded by 3*a*.

5. Quantitative Analysis. Beginning Course. *Five hours credit.* Deposit, $10. Recitations and laboratory work. Professor WILLARD and Assistant Professor MELOCHE.

This course includes the theory and practice of gravimetric and volumetric analysis and gravimetric separations.

Course 5 must be preceded by Course 3 or 3*b*.

7. Organic Chemistry. *Five hours credit.* Deposit, $10. Lectures, recitations, and laboratory work. Professor GOMBERG, Assistant Professor SCHOEPFLE, and Mr. SULLIVAN.

All students electing Course 7 should elect Course 7*a* in the following semester, the two courses being considered as a single course extending through the year. These courses are intended for students who are specializing in Chemistry or Chemical Engineering. All graduate students who elect organic chemistry as either the major or a minor subject should take Courses 7 and 7*a*, and not Course 10.

Course 7 must be preceded by Course 3 or 3*b*.

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10. Organic Chemistry. *Four hours credit.* Lectures and recitations. . Mr. SNOW.

This course is intended for students preparing to enter the Medical School or the Homœopathic Medical School, and for students who desire a shorter and more elementary course than Courses 7 and 7*a*. Given both semesters.

Course 10 must be preceded by Course 3 or 3*a*.

General and Physical Chemistry:

8E. Elementary Theoretical and Physical Chemistry. *Three hours credit.* Lectures and recitations. Professor BARTELL.

This course is intended for students in Chemical Engineering and may be taken by others only by special permission. Special attention will be paid to the study of chemical equilibrium, velocity of chemical reactions, and applications of physico-chemical theory.

This course must be preceded by Chemistry 3 or 3*b*, and Physics 2. A knowledge of calculus is also required.

13. Physical-Chemical Measurements. *Three to eight hours credit.* Deposit, $5. Laboratory work. Professor BARTELL, Dr. FERGUSON, and assistants.

The work of this course includes molecular weight determinations by vapor density, freezing point, and boiling point methods; determination of velocity of chemical reaction, viscosity, surface tension, solubility, etc.; optical measurements with refractometer, polarimeter, and spectroscope; electrical measurements such as conductivity, transport numbers, and electromotive force, including work with the hydrogen electrode.

The eight hours which are required for the completion of all the work in Course 13 may be divided between two semesters. The course must be preceded or accompanied by Courses 5 and 8.

14. Electrochemistry. *Two hours credit.* Lectures. Dr. FERGUSON.

This course constitutes an elementary treatment of the fundamental principles of the subject. The course must be preceded by Physics 2.

Courses 14, 14*a*, 14*b*, and 14*c* are designed to meet the rapidly increasing demand, by the electrochemical industries, for men who have a knowledge of the principles of electrochemistry and their application to industrial processes.

14*a*. Electrochemistry. Deposit, $5. *Two hours credit.* Laboratory work. Dr. FERGUSON.

This course must be preceded or accompanied by Course 14. It includes experiments to illustrate the general principles of electrochemistry, such as measurements of electrical conduc-

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tivity, resistance of primary and secondary cells, current by means of coulometers, single electrode and decomposition potentials, overvoltage, transport numbers, electromotive force; use of the hydrogen electrode; and methods of electrochemical analysis.

15. History of Chemistry and Development of Chemical Theory. *Two hours credit.* Lectures and seminary. Professor SMEATON.

16. Laboratory Research in Inorganic Chemistry. Deposit, $5. *Credit to be arranged.* Professor BIGELOW, Professor LICHTY.

18. Laboratory Research in Physical Chemistry. Deposit, $5. *Credit to be arranged.* Professor BIGELOW, Professor SMEATON.
Courses 16, 18, and 21 are intended for advanced students. They are open only to persons who receive permission from the instructor. Students electing these courses must be able to read French and German, and must have a knowledge of inorganic, organic, and analytical chemistry.

19. Seminary. Significance of Radioactive Phenomena in Chemistry. *One hour credit.* Professor BIGELOW.
Course 19 must be preceded by Courses 8 and 13. Permission must be obtained from the instructor to elect this course.

20. German Reading. *Two hours credit.* Professor LEE.
The object of this course is to familiarize the student with the technical terms used in German chemical literature. Classical treatises as well as important articles in current German chemical journals will be read. This course is equivalent to German 9E.

21. Research in Physical Chemistry. *Credit to be arranged.* Deposit, $5. Professor BARTELL and Dr. FERGUSON.
This course is open only to students who have had the fundamental courses in physics and chemistry.

22. Spectroscopic Analysis and Use of the Spectroscope. *Two hours credit.* Lectures and laboratory work. Deposit, $5. Professor LICHTY.
Course 22 must be preceded by Course 3*a*.

Analytical Chemistry:

28. Advanced Quantitative Analysis. *Three to five hours credit.* Deposit, $10. Lectures, recitations, and laboratory work. Professor WILLARD.
This course includes the analysis of coals, alloy steels, iron ores, silicates, and unknown minerals or alloys. If elected for three

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hours, the remaining two hours, which make up the complete course, may be elected to another time.

Course 28 is open to those who have taken Course 5, and Course 2 in Physics.

29. Elementary Chemical Microscopy. *Two hours credit.* Laboratory work. Professor CARNEY.

31. Independent Work in Mineral Analysis. Laboratory work. *Five hours credit.* Deposit, $10. Professors CAMPBELL and WILLARD.

Course 31 must be preceded by Course 28. It is desirable that this course be preceded by Course 27 and also by Course 2 in Mineralogy.

34. Chemical Reading. Reading and seminary work. *One hour Credit.* Professor CAMPBELL.

This course is adapted to students who intend to carry on research such as is given in Courses 36 or 37. As not more than five can be accommodated, permission should be obtained before electing the course.

36. Research in Inorganic Chemistry. Special attention will be given to the chemical constitution of metals, silicates, or other substances of importance. *Credit to be arranged.* Deposit, $5. Professor CAMPBELL.

Course 36 must be preceded by Course 28, and by such courses in physical or organic chemistry as may be necessary to prepare the student to carry on the work satisfactorily.

37. Original Investigation in Analytical Chemistry. Laboratory work. *Credit to be arranged.* Deposit, $5. Professors CAMPBELL and WILLARD.

Course 37 must be preceded by Course 28 and by such courses in physical or organic chemistry as may be necessary to prepare the student to carry on the work satisfactorily.

Organic Chemistry:

42. Organic Chemistry. *Two hours credit.* Recitations and laboratory work. Assistant Professor SCHOEPFLE and Mr. SULLIVAN.

Course 42 must be preceded or accompanied by Course 10.

43. Advanced Organic Chemistry and Ultimate Analysis. Laboratory work and reading. *Five hours credit.* Deposit, $10. Professor GOMBERG and Assistant Professor SCHOEPFLE.

Course 43 must be preceded by Courses 7 and 7*a*.

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44*a*. Food and Drug Analysis. *Three to five hours credit.* Deposit, $10. Laboratory work with reference reading. Assistant Professor GLOVER.
Course 44*a* must be preceded by Courses 5 and 7.

45. Advanced Organic Chemistry. The chemistry and manufacture of dyes and intermediates. Lectures and reading. *Two hours credit.* Assistant Professor SCHOEPFLE.
Course 45 must be preceded by Courses 7 and 7*a*.

49. Research in Organic Chemistry. Laboratory work and reading. *Credit to be arranged.* Deposit, $5. Professor GOMBERG.
Course 49 can be elected only by special permission.

Industrial and Engineering Chemistry:

51. Engineering Materials. Lectures and recitations. *Three hours credit.* Professors A. H. WHITE, and A. E. WHITE, Assistant Professors UPTHEGROVE, and BAKER, and Mr. BROWN.
An elementary study of the manufacture and properties of the ferrous and non-ferrous alloys, cements, clay products, and protective coatings.
This course must be preceded by Chemistry 2, 2*b*, or 2E.

52. Fuels and their Utilization. Lectures and recitations. *One hour credit.* Professor BADGER.
A descriptive study of fuels and their combustion, either directly or after conversion into gas or coke, and of regenerative furnaces and the means of obtaining high temperatures.
This course must be preceded or accompanied by Course 3, and Course 2 in Physics.

54. Salts, Acids, and Alkalies. Lectures and recitations. *Two hours credit.* Assistant Professor BAKER.
A descriptive study of the evaporation of salts and their separation from one another by fractional crystallization, of the manufacture of sulphuric, nitric, and hydrochloric acids, of the manufacture of alkali and chlorine by the older chemical processes and by electrolytic processes, together with consideration of some other electrolytic and electrothermal processes.
Course 54 must be preceded by Courses 8 or 8*E* and 52, and by Course 2 in Physics.

55. The Industrial Chemistry and Organic Compounds. *Four hours credit.* Lectures and assigned reading. Professor LESLIE.
Among the subjects treated are: starch, glucose, and sugar; fermentation and distillation; fats, oils, and soaps; bleaching and dyeing; tanning; paper manufacture.
Course 55 must be preceded by Courses 7, 7*a*, and 52. Course 54 is advised.

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59. Technical Gas Analysis, including Calorimetry and Photometry. *Two or three hours credit.* Deposit, $5. Laboratory work. Mr. GENIESSE and Mr. CARR.

Course 59 must be preceded or accompanied by Course 5.

SECOND SEMESTER

Foundation Courses in Chemistry:

1*b*. General and Inorganic Chemistry. *Four hours credit.* Deposit, $5. Lectures, recitations, and laboratory work. Professor LICHTY.

This course is essentially the same as Course 1 given the first semester. It offers an opportunity for those entering the University at the opening of the second semester to commence the study of chemistry, but no student will be admitted who might have elected Course 1. Special permission must be obtained from the instructor in order to elect this course.

2. General and Inorganic Chemistry. Continuation of Course 1, the hours and credits being the same in both semesters. Deposit, $5. Professor SMEATON and assistants.

2*E*. General and Inorganic Chemistry. Same as 2*E* the first semester. Deposit, $5. Dr. HODGES and assistants.

3. Qualitative Analysis. *Five hours credit.* Recitations and laboratory work. Deposit, $10. Assistant Professor CARNEY, Mr. MCALPINE, and Mr. COLE.

This course is the same as Course 3, given in the first semester.

By special arrangement with the instructor this course may be elected for *seven hours credit.* Four recitations, *M, Tu, Th, F,* at 10. Room 410. Laboratory work *four half days.* Mr. MCALPINE.

3*a*. Qualitative Analysis. *Four hours credit.* Deposit, $10. Recitations and laboratory work. Mr. COLE and Mr. SOULE.

This course is the same as Course 3*a*, given in the first semester.

3*b*. Qualitative Analysis. *Four hours credit.* Deposit, $10. Recitations and laboratory work. Mr. COLE.

Course 3*b* must be preceded by 3*a*.

5. Quantitative Analysis. Beginning Course. *Five hours credit.* Deposit, $10. Recitations and laboratory work. Professor WILLARD and Assistant Professor MELOCHE.

This course includes the theory and practice of gravimetric and volumetric analysis and gravimetric separations.

Course 5 must be preceded by Course 3 or 3*b*.

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6. Inorganic Preparations. *Three to seven hours credit.* Deposit, $5. Professor LICHTY.
Students electing this course must have completed Course 3*a*.
Course 6 involves the study of chemical reactions and principles as they apply to the preparation of the commonly used chemicals; a study of the properties of these chemicals, the conditions under which they remain in solution, if they are soluble, and their uses in chemical operations and as illustrative materials in teaching.

7*a*. Organic Chemistry. Continuation of Course 7. *Five hours credit.* Deposit, $10. Lectures, recitations, and laboratory work. Professor GOMBERG, Assistant Professor SCHOEPFLE, and Mr. SULLIVAN.

8. Elementary Theoretical and Physical Chemistry. *Four hours credit.* Lectures and recitations. Professor BIGELOW.
This course must be preceded by Course 3 or 3*b*. It may be elected by students planning to take the seven-year Combined Literary-Medical Curriculum, on the completion of Course 3*a*. Physics 2 is strongly recommended.

9. Inorganic Chemistry. Descriptive and experimental lectures, including selected topics. *Three hours credit.* Lectures and recitations. Professor LICHTY.
Course 9 must be preceded by Course 3 or 3*a* or an equivalent.
This course is intended for those students who need or desire a brief review and coördination as well as considerable extension of the work already done in General and Inorganic Chemistry.

10. Organic Chemistry. *Four hours credit.* Lectures and recitations. Assistant Professor SCHOEPFLE.
Course 10 must be preceded by Course 3*a* or 3*b*.
This course is intended for students preparing to enter the Medical School or the Homœopathic Medical School, and for students who desire a shorter and more elementary course than Courses 7 and 7*a*. Given both semesters.

General and Physical Chemistry:

13. Physical-Chemical Measurements. *Three to eight hours credit.* Deposit, $5. Laboratory work. Professor BARTELL, Dr. FERGUSON, and assistants.
The work of this course includes: molecular weight determinations by vapor density, freezing point, and boiling point methods; determination of velocity of chemical reaction, viscosity, surface tension, solubility, etc.; optical measurements with refractometer, polarimeter, and spectroscope; electrical measure-

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ments such as conductivity, transport numbers, and electromotive force, including work with the hydrogen electrode.
The eight hours which are required for the completion of all the work in Course 13 may be divided between two semesters.
The course must be preceded or accompanied by Courses 5 and 8.

[14*b*. Applied Electrochemistry. *Two hours credit.* Lectures. Dr. FERGUSON.
This course must be preceded by Course 14.
A study of the application of the principles of electrochemistry to analytical and industrial processes.
Omitted in 1920-1921.]

[14*c*. Applied Electrochemistry. Laboratory. *Two hours credit.* Dr. FERGUSON.
This course must be preceded or accompanied by Course 14*b*.
The course includes practice in electro-deposition of metals,-electrolytic oxidation and reduction processes, preparation by electrical means of inorganic and organic compounds and preparations requiring the electric furnace. Omitted in 1920-1921.]

14*d*. Advanced Electrochemistry. *Two hours credit.* Lectures. Dr. FERGUSON.
This course is a continuation of Course 14 and follows up the development of the theory of electrochemistry in more detail than is possible in Course 14.
Course 14*d* must be preceded or accompanied by Course 8.

15. History of Chemistry and Development of Chemical Theory. *Two hours credit.* Lectures and seminary. Professor SMEATON.

16. Laboratory Research in Inorganic Chemistry. *Credit to be arranged.* Deposit, $5. Professors BIGELOW and LICHTY.

18. Laboratory Research in Physical Chemistry. *Credit to be arranged.* Deposit, $5. Professors BIGELOW and SMEATON.
Courses 16, 18, and 21 are intended for advanced students. They are open to persons who receive special permission from the instructor. Students electing these courses must be able to read French and German, and must have a knowledge of inorganic, organic, and analytical chemistry.

19. Seminary. Significance of Radioactive Phenomena in Chemistry. *One hour credit.* Professor BIGELOW.
Course 19 must be preceded by Course 8 and 13. Permission must be obtained from the instructor to elect this course.

20*a*. Chemical Reading in French. *Two hours credit.* Professor LEE.
This course is of the same nature as Course 20, Chemical Reading in German. Elect as French 9E.

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21. Research in Physical Chemistry. *Credit and hours to be arranged.* Deposit, $5. Professor BARTELL and Dr. FERGUSON.

The course is open only to students who have had the fundamental courses in physics and chemistry.

23. Advanced Theoretical and Physical Chemistry. *Two hours credit.* Lectures. Professor BARTELL.

This course is a continuation of Course 8. It includes the general subject of chemical equilibrium and covers the special topics, thermochemistry, the phase rule, chemical statics and dynamics, in more detail than is possible in Course 8.

24. Theory and Practice of Exact Measurements, with laboratory practice in calibration, and construction of apparatus. Lectures and laboratory work. *Two or three hours credit.* Deposit, $5. Dr. FERGUSON.

Special permission must be obtained from the instructor in order to elect this course.

25. Chemistry of Colloids. *Two hours credit.* Lectures. Professor BARTELL.

This course is intended primarily for advanced students specializing in Chemistry and in Bio-Chemistry. It must be preceded by the fundamental courses in physics and chemistry, and is open only to those obtaining permission from the instructor.

26. Actinochemistry. *One or two hours credit.* Lectures, seminary, and laboratory work. Deposit, $5. Dr. HODGES.

This course will deal with the relations between radiant energy and chemical reaction, particular attention being paid to the photographic process. The laboratory work will deal largely with the processes of photography. It must be preceded by Course 8.

Analytical Chemistry:

27. Chemistry of the Rarer Elements. *One hour credit.* Lectures. Assistant Professor CARNEY.

A study of the occurrence, reactions, analytical determination and uses of the rarer elements, especial attention being paid to those of commercial importance. Lectures and recitations.

28. Advanced Quantitative Analysis. *Three to five hours credit.* Deposit, $10. Lectures, recitations, and laboratory work. Professor WILLARD.

This course includes the analysis of coals, alloy steels, iron ores, silicates, and unknown minerals or alloys. If elected for three

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hours, the remaining two hours, which make up the complete course, may be elected at another time.

Course 28 is open to those who have taken Course 5, and Course 2 in Physics.

29. Elementary Chemical Microscopy. *Two hours credit.* Laboratory work. Assistant Professor CARNEY.

30. Library Method in Chemistry. *Two hours credit.* Lectures. Mr. COLE.

This course is primarily intended to familiarize students with the Chemical Library and its use, in order to facilitate their advanced work in chemistry. Specific problems in chemistry will be assigned and the student will be expected to look up and report upon the original literature bearing upon them.

Course 30 must be preceded by Course 3 or 3*a*.

31. Independent Work in Mineral Analysis. Laboratory Work. *Five hours.* Deposit, $10. Professors CAMPBELL and WILLARD.

Course 31 must be preceded by Course 28. It is desirable that this course be preceded by Course 27 and also by Course 2 in Mineralogy.

34. Chemical Reading. Reading and seminary work. *One hour credit.* Professor CAMPBELL.

Course 34 requires special permission.

36. Research in Inorganic Chemistry. Special attention will be given to the chemical constitution of metals, silicates, or other substances of importance. *Credit to be arranged.* Deposit, $5. Professor CAMPBELL.

Course 36 must be preceded by Course 28 and such courses in physical or organic chemistry as may be necessary to prepare the student to carry on the work satisfactorily.

37. Original Investigation in Analytical Chemistry. Laboratory work. *Credit to be arranged.* Deposit, $5. Professors CAMPBELL and WILLARD.

Course 37 must be preceded by Course 28 and such courses in physical or organic chemistry as may be necessary to prepare the student to carry on the work satisfactorily.

Organic Chemistry:

42. Organic Chemistry. *Two hours credit.* Deposit, $10. Recitations and laboratory work. Assistant Professor SCHOEPFLE and Mr. SULLIVAN.

Course 42 must be preceded or accompanied by Course 10.

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42*a*. Organic Chemistry. Continuation of Course 42. *Two hours credit.* Deposit, $10. Recitations and laboratory work. Assistant Professor SCHOEPFLE and Mr. SULLIVAN.

43. Advanced Organic Chemistry and Ultimate Analysis. Laboratory work and reading. *Two to five hours credit.* Deposit, $10. Professor GOMBERG and Assistant Professor SCHOEPFLE.

44. The Chemistry of Alkaloids. *Four hours credit.* Deposit, $10. Lectures and laboratory work. Assistant Professor GLOVER.
Course 44 must be preceded by Courses 5 and 7.

44*a*. Food and Drug Analysis. *Three* to *five hours credit.* Deposit, $10. Laboratory work with reference reading. Assistant Professor GLOVER.
Course 44*a* must be preceded by Courses 5 and 7.

46. Seminary in Organic Chemistry. Lectures and reading. *Two hours credit.* Professor GOMBERG.
This course is intended primarily for students engaged in research work in organic chemistry, and can be elected only by special permission.

49. Research in Organic Chemistry. Laboratory work. *Credit to be arranged.* Deposit, $5. Professor GOMBERG and Assistant Professor SCHOEPFLE.
Course 49 requires special permission.

Industrial and Engineering Chemistry*:

51. Engineering Materials. The same as Course 51, given the first semester. Professor A. H. WHITE, Assistant Professors UPTHEGROVE, and BAKER, and Mr. BROWN.

52. Fuels and their Utilization. The same as Course 52, given the first semester. Professor BADGER.

54. Salts, Acids, and Alkalies. The same as Course 54, given the first semester. Assistant Professor BAKER.

59. Technical Gas Analysis. The same as Course 59, given the first semester. Deposit, $5. Mr. GENIESSE.

SUMMER SESSION OF 1921

For Undergraduates.

1. General and Inorganic Chemistry. *Four hours credit.* Professor LICHTY, Mr. BRITTON, and Assistant.

* Other courses in Technical Chemistry are announced by the Department of Chemical Engineering. Election of these other courses is subject to the rule governing the election of studies in other Colleges.

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2. General and Inorganic Chemistry. *Four hours credit.* Professor SMEATON, Mr. BRITTON, and Assistant.

3. Qualitative Analysis. *Five hours credit.* Mr. COLE, and Assistants.

For Graduates and Undergraduates.

6*s*. Inorganic Preparations. *Two to four hours credit.* Professor LICHTY.

5. Quantitative Analysis. *Five hours credit.* Professor WILLARD, Mr. ROSS, and Assistant.

28. Advanced Quantitative Analysis. *Three to five hours credit.* Professor WILLARD, Mr. ROSS, and Assistant.

10*s*. Organic Chemistry. *Two hours credit.* Assistant Professor SCHOEPFLE.

42. Organic Preparations. *Two to four hours credit.* Assistant Professor SCHOEPFLE, and Mr. SNOW.

8E. Elementary, Theoretical, and Physical Chemistry. *Three hours credit.* Dr. HODGES.

13. Physical Chemical Measurements. *Three to eight hours credit.* Dr. FERGUSON, Dr. HODGES, and Assistant.

14. Electrochemistry. *Two hours credit.* Dr. FERGUSON.

15. History of Chemistry and Development of Chemical Theory from remote times to the present. *Two hours credit.* Professor SMEATON.

33*a*. Chemical Technology of Fuel Utilization. *One hour credit.* Mr. BROWN.

35. Technical Gas and Fuel Analysis. *Two hours credit.* Mr. BROWN, and Assistant.

11*a*. Drug Assaying and Pharmacopoeial Testing. *Four hours credit.* Assistant Professor GLOVER.

44*a*. Analysis of Foods, Drugs, Etc. *Three or five hours credit.* Assistant Professor GLOVER.

For Graduates.

37. Original Investigation in Analytical Chemistry. *Credit to be arranged.* Professor WILLARD.

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39. Laboratory Work in Chemical Technology and Chosen Subjects. *Three to eight hours credit.* Professor LESLIE, Assistant Professor UPTHEGROVE, and Mr. BROWN.

16. Laboratory Research in Inorganic Chemistry. *Credit to be arranged.* Professor LICHTY.

43. Organic Synthesis and Ultimate Analysis. *Two to four hours credit.* Assistant Professor SCHOEPFLE.

18. Laboratory Research in Physical Chemistry. *Credit to be arranged.* Professor SMEATON.

21. Laboratory Research in Physical Chemistry. *Credit to be arranged.* Dr. FERGUSON, and Dr. HODGES.

Metallurgy†

FIRST SEMESTER

6. Metallurgy of Iron and Steel. Class work. *Two hours credit. Hours to be arranged.* Assistant Professor WOOD.
A detailed study of the methods employed in the production of the various iron and steel products; thermal studies of some of the major operations; correlation of the physical properties of the metals and their heat and mechanical treatments.
Open to those who have completed Course 3 in Chemistry.

7. Metallurgy of the Non-ferrous Metals. Class work. *Two hours credit. Hours to be arranged.* Assistant Professor UPTHEGROVE.
This course covers the conversion practice for copper, zinc, lead, tin, and aluminum and the production of non-ferrous alloy castings.
Open to those who have completed Course 3 in Chemistry.

8. Metallography of Metals. Class and laboratory work. *Two hours credit. Hours to be arranged.* Assistant Professor UPTHEGROVE.
In this course a special study is made of the microscopic constituents of iron and steel and the common non-ferrous metals. The effect of heat treatments, mechanical working and composition on the structure and properties are also studied.
Open to those who have completed Metallurgy 6.

10. Seminary on the Theory of Steel and Properties of Metallic Solutions. *One hour credit.* Professor CAMPBELL.

† Other courses in Metallurgy are announced by the department of Chemical Engineering. Election of these other courses is subject to the rule governing the election of studies in other Colleges.

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SECOND SEMESTER

6. Metallurgy of Iron and Steel. Same as Course 6, the first semester. Assistant Professor WOOD.

8. Metallography of Metals. Same as Course 8, the first semester. Assistant Professor UPTHEGROVE.

10*a*. Continuation of Course 10. *One hour credit.* Professor CAMPBELL.

CLASSICAL ARCHAEOLOGY

(GROUP I)

The following courses do not require a knowledge of Greek or of Latin. The large collection of lantern slides and photographs owned by the University makes it possible to illustrate all these courses fully. The collection of casts of ancient sculpture in the Art Gallery is also utilized in the courses in ancient art. A more complete statement of the material at hand for the study of Roman Archaeology is given under the department of Latin.

For courses in Greek and Roman Art, formerly announced here, see the department of Fine Arts.

FIRST SEMESTER

4. Ancient Greek Life. *Two hours credit.* Assistant Professor ROBBINS.

The life of the Greeks will be fully illustrated from objects of art, especially vase paintings. Special attention will be given to Greek houses, temples, armor, dress, amusements, athletics, art, and crafts.

Lectures, illustrated with stereopticon; assigned readings.

33. Greek Vases. Illustrated lectures and assigned readings. *Two hours credit.* Professors WINTER and BONNER.

The decorated vases of the Greeks will be studied partly as objects of art and partly as documents of Greek history, civilization, and literature. The lectures will be illustrated by lantern slides and by plates from the University's collection of archæological material. The first part of the course, dealing with the history and technique of Greek ceramics, will be given by Professor WINTER; the second part, dealing with the interpretation of mythological scenes and of pictures suggested by episodes in literary works, will be conducted by Professor BONNER.

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SECOND SEMESTER

2*a*. Monumental History of the City of Rome. A survey of the monuments of art of different periods, with special study of the Forum, the Imperial palaces, and other topographical groups of special importance. Lectures, illustrated. *Three hours credit.* Professor WINTER.

[2*b*. Roman Life as Illustrated by Works of Art and Objects of Common Use. The Roman house and home life, dress, social activities, athletics, trades, professions, the circus and theater, public ceremonies, and the transformation of Roman society under the empire. Lectures, with stereopticon illustrations, plates, and the study of specimens in the University collections. *Three hours credit.* Professor KELSEY. Omitted in 1920-1921.]

6. Greek Mythology. *Two hours credit.* Professor BONNER. Illustrated lectures and assigned readings. Classical myths will be treated with special reference to their influence on modern literature.

Students may enter this course after the first week of the semester only by special permission of the instructor.

8. Topography and Monuments of Ancient Athens. Illustrated lectures and assigned readings. *Two hours credit.* Room A, Memorial Hall. Professor WINTER.

DRAWING

Engineering Drawing

FIRST SEMESTER

1. Geometrical Drawing. *Two, three,* or *four hours credit.* Assistant Professor FINCH.

4. Descriptive Geometry I. Lectures and Drawing. *Two hours credit.*

4*a*. Descriptive Geometry and Shades and Shadows. *Three hours credit.* Assistant Professor BENNETT.

5. Descriptive Geometry II. Lectures and Drawing. *Two hours credit.*

Course 5 must be preceded by Course 4, of which it is the continuation.

5*a*. Perspective and Stereotomy. *Two hours credit.* Assistant Professor BENNETT.

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10. Free-Hand Lettering. *Two hours credit.* Assistant Professor PALMER.

12. Statistical Charting. *Two hours credit.* Professor GOULDING.

SECOND SEMESTER

1. Geometrical Drawing. *Two, three,* or *four hours credit.* Assistant Professor FINCH.

4. Descriptive Geometry I. Lectures and Drawing. *Two hours credit.*

4*a*. Descriptive Geometry and Shades and Shadows. *Three hours credit.* Assistant Professor BENNETT.

5. Descriptive Geometry II. Lectures and Drawing. *Two hours credit.*

Course 5 must be preceded by Course 4, of which it is the continuation.

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10. Free-Hand Lettering. *Two hours credit.* Assistant Professor PALMER.

12. Statistical Charting. *Two hours credit.* Professor GOULDING.

SUMMER SESSION OF 1921

Six courses will be given in the College of Engineering. See the chapter on that College.

Free-Hand Drawing and Painting

The aim of the instruction in free-hand drawing and in painting is to teach accurate observation of form, proportions, light and shade, and color, and their artistic representation and interpretation, both as a matter of general education and as part of a more specific training for teaching, in pictorial or decorative art, or in architecture.

For the general student, Courses 21, 22, and 24 will give an elementary training in drawing and painting. Course 30 provides more advanced work in painting; Courses 25, 26, and 27, more advanced training in drawing. Course 23 is a special course in the drawing of ornament for students of architecture and decoration, while Course 35 is primarily for architectural students, although open to others. Outdoor sketching and painting can best be studied during the summer session.

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At present there are no classes in portrait painting nor painting from the costume model, but such instructions can, under certain conditions, be arranged for groups of students who have specially advanced preparation.

The drawing is done in pencil, crayon, charcoal, and pen and ink, from various kinds of objects and models, including ancient, mediæval, Renaissance, and modern ornament and sculpture. Rapid sketching from the figure is carried on as part of Courses 27 and 28 to stimulate simple indication of essentials.

The painting is done mostly in water colors, although non-architectural students may paint in oil.

Still-life painting in water color or oil cannot be studied profitably without some preliminary training in free-hand drawing (Drawing 21 and 22). For drawing from the living model some preliminary training is required from the antique (Drawing 25 and 26).

All the courses are given both semesters and instruction is given in Courses 21 to 26, inclusive, every morning and afternoon. The hours for these and other courses are shown in the schedule of the Colleges of Engineering and Architecture published at the beginning of each semester.

In general, six hours class work per week for a semester are required for a two-hour credit course. A given course must be elected with a single instructor and in periods of not less than two hours consecutively. Advancement in all these courses is individual, depending on the progress made by the student and determined largely by work done without criticism.

BOTH SEMESTERS

21. Free-Hand Drawing. *Two hours credit.* Introductory Course. Mr. MAKIELSKI, Mr. BARNES, Mr. O'DELL, Miss HELLER.
Drawing from simple forms in line and light and shade.
Free-Hand perspective.

22. Free-Hand Drawing. *Two hours credit.* Continuation of Course 21. Mr. MAKIELSKI, Mr. BARNES, Mr. O'DELL, Miss HELLER.
Drawing from simple forms.

23. Free-Hand Drawing. *Two hours credit.* Mr. BARNES, Mr. O'DELL.
Drawing from decorative forms and portions of the figure.
Primary for students of architecture and decoration.
Must be preceded by Drawing 22.

24. Water Color Painting. *Two hours credit.* Mr. MAKIELSKI, Mr. BARNES.
Painting from still life in monochrome wash and in water colors.
Must be preceded by Courses 21 and 22 or their equivalent.

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25 and 26. Free-Hand Drawing. *Two hours credit each.* Mr. MAKIELSKI, Mr. BARNES.
Drawing from the full figure.

27 and 28. Free-Hand Drawing. *Two hours credit each.* Mr. MAKIELSKI.
Drawing from life. Figure sketch class.
Admission to these courses is limited to those who have satisfactorily completed the preceding courses or their equivalent.

30. Water Color Painting. *Two hours credit.* Mr. BARNES.
Painting in water color from still life. This course must be preceded by Course 24 or its equivalent.

[33. Clay Modeling. *Two hours credit.* Not given in 1920-1921.]

35. Pen and Ink Drawing. *One* or *two hours credit.* Elective. Mr. BARNES.
Students not registered in Architecture should have the equivalent of six credit hours in free-hand drawing before taking this course.
For regular students of architecture this course must be preceded by Courses 4*a*, 21, 22, and 23, in Drawing and Architecture 5.

SUMMER SESSION OF 1921

An Arts course for supervisors, art instructors, grade teachers, and school principals will be given by Miss GRATTAN, Supervisor of Art in the public schools of Cedar Rapids, Iowa. See later chapter.

ECONOMICS

(GROUP III)

Political Economy and Business Administration

POLITICAL ECONOMY.—The instruction in Political Economy is arranged to meet the needs of three classes of students. The first class comprises those whose principal work lies in other departments of instruction, but who desire a cursory introduction to the science. Students of this class are advised to take Courses 1 and 2, unless their time is very limited, in which case they may take Course 1*a*. The second class comprises those who desire to make a fairly thorough study of economics, but who have not time to take the advanced or the semi-professional work offered. Such students are advised to follow Courses 1 and 2 with one or more of the following: 3, 4, 9, and 15. The third class embraces those students who desire to make a thorough study of the science of economics, and especially those who wish to combine the study of political economy and finance with

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history, political science, and law for the purpose of preparing themselves for some one of the several professions or careers to which this group of studies naturally leads. Such persons will have no difficulty enlarging their program from the advanced electives.

It is very desirable that students specializing in economics should have a good knowledge of German and French. For second-year work in those languages, therefore, such students should elect courses devoted to reading rather than to conversation and composition, and, in the case of German, these courses should be the ones specially arranged for students of history and the political sciences.

BUSINESS ADMINISTRATION.—Special programs, on the completion of which the student will receive a special certificate in addition to his diploma, have been arranged to meet the needs of those students who wish to prepare themselves for a general business career or for particular lines of business, such as railway administration, insurance, accounting, and banking. Students who desire to enroll in one of these programs should consult with Professor SHARFMAN at the beginning of their university residence or as soon as possible thereafter.

CONSULTATION HOURS.—Throughout registration week, Professor SHARFMAN, daily, 10 to 12 and 2 to 4. Room 107, Ec.

FIRST SEMESTER

1. Elements of Political Economy, I. Principles. *Five hours credit.* Lectures and recitations. Professor TAYLOR, Mr. J. P. ADAMS, Mr. WALKER, Mr. FLECK, Mr. ROSS, Mr. SELTZER, Mr. BENNER, Mr. CAHOW, Mr. CHAMBERLAIN, Mr. ELLIS, Mr. TAGGART, Mr. CLARK, Mr. BERGER, Mr. THORP, Dr. MAY, Mr. NUTTER, and Mr. HANSELMAN.

This course should precede all other courses in Political Economy, except 1*a* or 1*E*.

The course will be repeated in the second semester, and it is hoped that a considerable number of persons will elect the course for that semester rather than for the first.

1*a*. General Economics. Lectures and quizzes. *Three hours credit.* Professor FRIDAY.

This course is designed for seniors and graduates, and for juniors who receive special permission, whose chief interest is in some other department and who have time for but one or two courses in economics. It is not open to students who have had or are taking Course 1 or 1E.

The course covers a study of industrial society, partly descriptive and partly analytic, and undertakes to explain the legal and business institutions by which industrial conduct is con-

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trolled. It covers also a cursory presentation of the development of economic theory, with especial reference to the classical school of political economy.

1E. Elements of Economics. Engineers' Course. *Three hours credit.* Lectures and recitations. Mr. LUBIN.

This course is especially designed to meet the needs of students whose work lies in professional departments, particularly engineering. It will be devoted to a consideration of the fundamental economic principles and to the important practical current problems of the economic world, particularly insofar as they illustrate these principles.

No student can receive credit for this course and Course 1 or Course 1*a*.

This course is intended primarily for Engineers. Literary students will be admitted only with the special consent of the instructor.

3. Labor Problems. *Three hours credit.* Lectures and recitations. Mr. LUBIN.

This course is designed to give the student a descriptive and analytic outline of the chief problems arising out of the wage-earner's place and part in modern industry, and the relation of the labor interest to current trends in modern society. It will undertake to disclose the historic background of the modern labor movement; to analyze the economic doctrines involved in current and past controversies over wages and trade organizations; and to pass in critical review the many plans submitted for the solution of definite phases of the labor problem, especially those that rely on legislative enactments and administrative supervision.

This course must be preceded by Courses 1 and 2 or their equivalents.

4. Principles of Public Finance. *Three hours credit.* Dr. HAUHART.

This course treats of public expenditures, revenues, and debts. Some attention will also be given to budgets and treasury organization, but the stress of the course will fall on the principles and problems of taxation. Course 1, 1*a*, or 1*E* is a prerequisite, or, in special cases, permission of the instructor.

7. Essentials of Economic Theory. *Two hours credit.* Professor TAYLOR.

This course is intended to meet the needs of persons who wish to make a fuller study of the leading problems of economic theory than was feasible in Course 1. It should be taken by all students who expect to teach economic subjects. It will be required for admission to Courses 13, 13*a*, 13*b*, etc.

This course must be preceded by Course 1 or an equivalent.

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8. Economic Statistics. *Two hours credit.* Professor FRIDAY.
For graduate students; open to seniors by special permission.
This course is devoted to a study of economic problems whose solution depends upon statistical investigation. For 1920-1921 the subject will be, "The Course of Profits from 1890 to 1920, and their Effect upon the Accumulation of Capital and the Distribution of Wealth and Income."

9. Banking, Money, and Foreign Exchange. *Three hours credit.* Lectures and recitations. Assistant Professor CALHOUN.
This is a general course designed to acquaint the student with the most important features of the institutions of banking, money, and foreign exchange. A study is made of the theory of these subjects and the character of their development. Particular attention will be given to a study of the Federal Reserve System.
Prerequisite: Economics 1 or an equivalent.
(Students who have had Economics 10—Money, Credit, and the Level of Prices—will be admitted to this course the first semester of 1920-1921 only.)

11. The Money Market. *Two hours credit.* Professor FRIDAY.
A study of the factors which determine the demand for capital, the supply of capital, and the rate of interest in the various money markets.
Prerequisites: Courses 1 and 9.

13*d*. Studies in Economic Theory. *Two hours credit.* Professor TAYLOR.
This course is given in a three-year cycle, appearing as 13, 13*b*, and 13*d* in the first semester, followed by 13*a*, 13*c*, and 13*e* in the second semester. This year they are elected as 13*d* and 13*e*. Course 7 is a prerequisite.
The work consists of special studies in the leading problems of economic theory, such as the nature and origin of value, the laws of normal value, the origin of interest, the principles regulating distribution, and so on. Designed for graduate students; open to others only by special permission.

15. Corporations. Lectures, reading, and discussion. *Three hours credit.* Professor SHARFMAN and Mr. CAVERLY.
This course undertakes a study of corporations as an element in industrial society, laying special emphasis upon the so-called trust problem and questions of government regulation of industry.
It deals with the forms of business organization, with particular stress on the nature and history of corporations and their significance in modern life. While it offers an account of the promotion, capitalization, and reorganization of corporations,

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questions of finance are for the most part subordinated to a consideration of the economic aspects of industrial combination, such as its effects upon efficiency, wages, profits, and prices. The course is concluded by a study of the Sherman Anti-Trust Act and a discussion of the recent trust legislation.
This course must be preceded by Course 1 or an equivalent.

17. Research Work.
This course is designed for students who desire to pursue independent research in connection with topics not covered in any other seminary. Supervision over this work will be assigned to that instructor in the department who is most interested in the subject chosen. This course may be elected only with the approval of the Head of the department. The credit allowed will depend on the amount and character of the work done.

31. Marketing. *Three hours credit.* Lectures and recitations. Professor GRIFFIN.
This is a fundamental course in the principles and methods of marketing. It will include a discussion of the marketing of raw materials and of agricultural and manufactured products, and a consideration of the characteristics of the wholesale and retail trade. Some specific problems of marketing, such as speculation, elimination of middlemen, price maintenance, and the cost of marketing, will be considered. The course will be concluded by a survey of selling policies of the manufacturer.
This course must be preceded by Course 1 or an equivalent.

31*a*. Problems in Marketing. *Two hours credit.* Professor GRIFFIN.
This course is designed for students who desire to do independent work in special problems of marketing.
This course must be preceded by Courses 1 and 31, and may be elected only with the approval of the instructor.

32. Industrial Organization and Management. *Three hours credit.* Lectures and recitations. Assistant Professor EDMONDS.
This is a fundamental course in the principles of internal organization and management of industrial enterprises. It will include a discussion of the nature of modern industry; location, layout, and types of construction; materials, equipment, and power; planning and routing; statistics and accounting; scientific management and the employment of labor; purchasing, traffic, credit, and collections.
This course will be repeated in the second semester.
Prerequisite: Economics 1 or an equivalent.

32*a*. Problems in Industrial Organization. *Two hours credit.* Assistant Professor EDMONDS.
This course will consist of a study of selected problems in the

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field of Industrial Organization. Questions which were of special interest in Course 32 will be studied in greater detail.
Prerequisite: Course 32 and the consent of instructor.

[36. Railway Organization and Operation. Lectures, readings, and reports. *Three hours credit.* Professor ADAMS.
Students who elect this course will be expected to elect Course 36*a* in the second semester.
This course undertakes a study of problems incident to the operation of steam railroads from the standpoint of both the railway administrative officers and of public regulatory bodies.
It deals with problems of railway organization, and administrative methods of controlling expenses, and of auditing revenues. It considers the use of statistics as an aid to the attainment of economics in operation.
This course must be preceded by Course 1, 2, 6, and 38.
Graduate students or special students who desire intensive training in railway operation or administration may secure two hours additional work during the first semester by enrolling in Course 17. Omitted in 1920-1921.]

37. Corporation Finance. Lectures, reading, and discussion. *Three hours credit.* Professor SHARFMAN and Mr. CAVERLY.
This course aims to study the organization and intercorporate relations of modern railway and industrial enterprises, with special reference to problems of finance. It deals with such subjects as the nature and varieties of stocks and bonds, the distribution and price movements of corporation securities, corporate promotion, capitalization, and reorganization.
Course 15 must precede or accompany this course.

38. Principles of Accounting, I. *Four hours credit.* Lectures, recitations, and laboratory. Professor PATON, Assistant Professor SCHMITT, Dr. HAUHART, Mr. J. P. ADAMS, Mr. WALKER, Mr. ROSS, Mr. TAGGART, and Mr. CHAMBERLAIN.
This is an introductory course in general principles. The work begins with the analysis and classification of transactions and accounts according to the principles of double-entry. A more intensive study of account classification is then undertaken, among other principles that of functional classification for managerial purposes being stressed. The accounting significance of valuations is considered, and special topics, such as the treatment of deferred charges and credits, the distinction between maintenance and improvement, the nature of wasting assets, are discussed. Particular attention is given to the closing of accounts and to the construction and interpretation of working, income, and balance sheets.
Course 1 or an equivalent must precede or accompany this course.

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39. Principles of Accounting, II. *Four hours credit.* Lectures, recitations, and laboratory. Professor PATON, Assistant Professor SCHMITT, and Mr. J. P. ADAMS.

This is the same as Course 39, given the second semester.

40. Cost Accounting. *Three hours credit.* Lectures and recitations. Assistant Professor SCHMITT.

This course undertakes an analysis of accounts and accounting statements for manufacturing concerns, with special reference to the specific problems of management. Various methods of allocating indirect expense to production factors and to specific products are studied. The principles of costing are illustrated in a complete cost set which is worked out by the student as a laboratory exercise.

Course 38, or an equivalent, is a prerequisite.

44. The Theory of Accounts. *Two hours credit.* Professor PATON.

In this course a special study is made of the underlying structure of modern accounts and unsettled matters of principle and procedure. Readings will be assigned from representative authors.

This course may be elected only with the permission of the instructor.

Courses 38 and 39 are prerequisites.

46. Business Law, I. Lectures, reading, and discussion of selected cases. *Three hours credit.* Mr. WOLAVER.

This course, designed to meet the special needs of students in business administration, deals with the legal significance of the more important business situations likely to arise in commercial and industrial life. It undertakes, through a study of concrete cases and legal rules, to acquaint the student with the point of view of the law, as a means of helping to prepare the business man to avoid legal controversy as far as possible, and to coöperate intelligently with legal counsel when litigation can not be avoided.

The training afforded by this course and the subject matter with which it deals extend through the entire year, and students electing Course 46 in the first semester will be expected to elect Course 47 in the second semester.

During the first semester the course deals primarily with contractual transactions, involving a study of the leading principles of the law of contracts, sales, and commercial paper. During the second semester the course deals largely with legal questions arising out of the various forms of business association, involving a study of the leading principles of the law of agency, partnership, and corporations. Throughout the course

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emphasis is laid upon the practical application of legal rules in ordinary business dealings.

This course is not open to students intending to pursue the professional study of law.

49. Elementary Methods in Statistics. *Two hours credit.* Elect as Mathematics 49. Assistant Professor CARVER.

This course deals with the construction of schedules, gathering data, editing schedules, arranging and presenting statistics in various tabular and graphical forms.

51. Introduction to the Mathematical Theory of Interest. *Three hours credit.* Elect as Mathematics 51. Professor GLOVER.

The aim of this course is to explain and illustrate the application of Mathematics to financial transactions to such an extent as may be of interest and value to the general student.

It must be preceded by Mathematics 1 (or 1E).

The attention of students who desire to specialize in statistical and actuarial mathematics is called to a note concerning the arrangement of their work in this Announcement under Mathematics.

52. Introduction to the Mathematical Theory of Insurance. *Three hours credit.* Elect as Mathematics 52. Assistant Professor CARVER.

Course 52 is open to those who have completed Courses 1 (or 1E) and 51 in Mathematics.

55. Advanced Mathematical Theory of Interest and Life Contingencies, I. *Four hours credit.* Elect as Mathematics 55. Professor GLOVER.

For further information, see Course 55 in Mathematics.

59. Mathematical Theory of Statistics. Advanced Course. Elect as Mathematics 59. *Two hours credit.* Mr. BARNARD.

67. Casualty Actuarial Theory. *Three hours credit.* Elect as Mathematics 67. Assistant Professor CARVER.

SECOND SEMESTER

1. Elements of Political Economy, I. Principles. *Five hours credit.* Lectures and recitations. Professor TAYLOR, Mr. J. P. ADAMS, and others.

This is a repetition of Course 1 of the first semester.

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1E. Elements of Economics. Engineers' Course. *Three hours credit.* Lectures and recitations. Mr. LUBIN.

This is a repetition of Course 1E of the first semester.

This course is intended primarily for Engineers. Literary students will be admitted only with the special consent of the instructor.

2. Elements of Political Economy, II. Current Problems. *Three hours credit.* Lectures and recitations. Professor FRIDAY, Mr. LUBIN, and others.

This course is a continuation of the Elements of Political Economy given in the first semester. Students who have taken Course 1*a* or 1E will be permitted to elect this course.

The purpose of this course is to apply economic principles to current social and industrial problems and to make clear the historic background of such problems.

3*a*. Labor Problems. *Two hours credit.* Mr. LUBIN.

This course is given as a seminary in continuation of Course 3. Students will be required to select some special phase of the Labor Problem for intensive investigation; to make occasional reports before the class on their findings; and to submit a thesis incorporating the results of their research.

5. Seminary in Public Finance. *Two hours credit.* Professor ADAMS, with Dr. HAUHART.

In 1920-1921 the topic of study will be war taxation and war credits. A thesis will be required. This course will be limited to not more than twelve students. The permission of the instructor must be obtained for its election.

6. Railway Problems. Lectures, reading, and discussion. *Three hours credit.* Professor SHARFMAN and Mr. CAVERLY.

This course considers the social and industrial significance of modern transportation, traces the development of railway transportation, analyzes the chief railway problems in the United States, with special reference to the nature of railway competition and the theory and practice of rate-making, and devotes particular attention to the regulation of railways, especially by the federal government. The course will be concluded by a discussion of the war administration of the railroads and of the adjustments in railway regulation which accompanied the return of the roads to private operation.

This course must be preceded by Course 1 or an equivalent.

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f. Essentials of Economic Theory. *Two hours credit.* Professor TAYLOR.
Repeated from first semester.
This course must be preceded by Course 1 or an equivalent.

8a. Economic and Financial Investigations. *Two hours credit.* Professor FRIDAY.
For graduate students; open to seniors by special permission.
This course is designed to acquaint the student with the technique of conducting financial investigations, necessitated by government control, corporate reorganization, and economic research.

9. Banking, Money, and Foreign Exchange. (Repeated from first semester.) *Three hours credit.* Lectures and recitations. Assistant Professor CALHOUN.
This is a general course designed to acquaint the student with the most important features of the institutions of banking, money, and foreign exchange. A study is made of the theory of these subjects and the character of their development. Particular attention will be given to a study of the Federal Reserve System.
Prerequisite: Economics 1 or an equivalent.

[10. Credit, Price, Levels, and Business Cycles. *Two hours credit.* Professor FRIDAY.
This course must be preceded by Courses 1 and 9.
Omitted in 1920-1921.]

12. Practical Banking Problems. *Two hours credit.* Assistant Professor CALHOUN.
An intensive study of the important problems connected with bank organization and administration. The interpretation of financial news and the compilation and interpretation of banking statistics will be stressed.
Prerequisites: Courses 1, 9, and 38.

13e. Studies in Economic Theory. *Two hours credit.* Professor TAYLOR.
For details, see announcement for first semester.
Course 7 is a prerequisite.

16. Public Service Industries. Lectures, reading, and discussion. *Two hours credit.* Professor SHARFMAN.
This course considers the nature of public service industries, such as railroads, street railways, gas and electric companies, telephone and telegraph companies, and their relation to the state and to the municipality. The problem of public ownership and public control is given careful study on the basis of American and European experience, with special consideration of commission regulation in the United States.
Courses 1 and 6 are prerequisites.

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18. Research Work.
This course is designed for students who desire to pursue independent research in connection with topics not covered in any other seminary. Supervision over this work will be assigned to that instructor in the department who is most interested in the subject chosen. This course may be elected only with the approval of the Head of the department. The credit allowed will depend on the amount and character of the work done.

32. Industrial Organization and Management. *Three hours credit.* Lectures and recitations. Assistant Professor EDMONDS.
This is a fundamental course in the principles of internal organization and management of industrial enterprises. It will include a discussion of the nature of modern industry; location, layout, and types of construction; materials, equipment, and power; planning and routing; statistics and accounting; scientific management and the employment of labor; purchasing, traffic, credit, and collections.
Repeated from first semester.
Prerequisite: Economics 1 or an equivalent.

33. Foreign Trade. *Two hours credit.* Lectures and recitations. Professor GRIFFIN.
This course deals with the nature and content of Foreign Trade. It is introduced with a discussion of the economic problems underlying international trade. It then presents a study of the present trade of the countries of the world. Commercial policies, international investments, shipping facilities, and the relation of the government to shipping and foreign trade are studied. The latter half of the course will be devoted to a consideration of the nature of the foreign market and the technique of the export business.
This course must be preceded by Course 1 or an equivalent.

33*a*. Problems in Foreign Trade. *Two hours credit.* Professor GRIFFIN.
This course is designed for students who desire to do independent work on special problems of foreign trade.
This course must be preceded by Courses 1 and 33, and may be elected only with the approval of the instructor.

34. Employment Management. *Two hours credit.* Assistant Professor EDMONDS.
This is a course in the employment, training, control, and compensation of labor. In the latter part of the course consideration is given to the problem of industrial relations as viewed from the standpoint of the management. The course is designed to give students a knowledge of this important business prob-

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lem as well as to fit the needs of those students who wish to prepare themselves for positions as employment managers.
Prerequisites: Courses 1 and 32, or their equivalent.

[34*a*. Problems in Employment Management. *Two hours credit.* Assistant Professor EDMONDS.
In this course the more important phases of employment management will be developed by means of reports and discussion. Current problems in the employment field will be covered.
This is an advanced course following Course 34.
Prerequisites: Course 34 and the consent of instructor. Omitted in 1920-1921.]

36*a*. Railway Accounts. Lectures, readings, and reports. *Three hours Credit.* Assistant Professor SCHMITT.
This course undertakes a study of the standardized system of accounts prescribed for railroads by the Interstate Commerce Commission. It deals with construction, revenue, expense, income, profit and loss, and balance sheet accounts. This course gives special emphasis to the use of accounting statements by operating officers, by public service commissions, and by investors in railway securities.
Graduate students or special students who desire intensive training in railway accounts and statistics may secure two hours additional work during the second semester by enrolling in Course 18.

38. Principles of Accounting, I. *Four hours credit.* Lectures, recitations, and laboratory. Professor PATON, Mr. WALKER, Mr. ROSS, and Mr. TAGGART.
This is a repetition of Course 38 of the first semester.

38*E*. Principles of Accounting. *Three hours credit.* Mr. J. P. ADAMS.
This course is intended primarily for students whose work lies in professional departments, particularly engineering. The subject matter of the course is similar to that of Course 38. Special attention is given to the problems of maintenance and depreciation, and to the analysis of transactions involving interest calculations. No regular laboratory work is required, but problems and exercises are assigned which illustrate technique as well as principles.

38*P*. Elements of Accounting. *Two hours credit.* Dr. HAUHART.
This is an elementary course designed to meet the needs of students of pharmacy. The work of the course consists primarily in a study of the principles of the double-entry system, and in the construction and analysis of simple financial statements. Some attention is given to business papers and clerical routine. Literary students are not admitted.

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39. Principles of Accounting, II. *Four hours credit.* Lectures, recitations, and laboratory. Professor PATON, Assistant Professor SCHMITT, Dr. HAUHART, Mr. J. P. ADAMS, and Mr. WALKER.
This is a continuation of Course 38. It is also open (with permission) to students who have completed Course 38*E*. The work of this course includes a study of the accounts and transactions involving partners' equities, capital stock, surplus and reserves, and liabilities; the transactions dealing with principal and interest, including such topics as the treatment of bond discounts and premiums, sinking funds, etc.; the problems of the organization and construction period; the bases of revaluation; depreciation policies and methods; and the intangible assets. A considerable time is devoted to the construction and analysis of detail and summary financial statements. The course concludes with a brief statement of some of the characteristics of the more important special branches of accounting.

42. Municipal and Institutional Accounting. *Two hours credit.* Mr. WALKER.
An inquiry into the technique of municipal accounts, and a study of municipal finance and budget making, constitute the first part of this course. Later, attention is directed to the methods of accounting peculiar to such public and semi-private enterprises as educational institutions, hospitals, etc.
Courses 38 and 39 are prerequisites.

43. Auditing and Special Accounting Systems. *Three hours credit.* Assistant Professor SCHMITT.
This is an advanced course designed to meet the needs of students who have a professional interest in accounting. In studying the technique of auditing, C. P. A. examination questions are largely used for illustrative material. During the semester each student is required to prepare a report on a special system of accounts for some particular line of business such as retailing, building, brokerage, farming, etc.
Courses 38 and 39 are prerequisites.

43*a*. Income Tax Procedure. *Two hours credit.* Professor PATON.
In this course are considered the important features of the income and excess-profits tax program of the federal government, with especial reference to their relation to accounting.
Courses 38 and 39 are prerequisites.

47. Business Law, II. Lectures, reading, and discussion of selected cases. *Three hours credit.* Mr. WOLAVER.
For a full description of the scope and character of this course, see Course 46 given in the first semester, of which it is a continuation and by which it must be preceded.
This course is not open to students intending to pursue the professional study of law.

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48. Insurance Accounting. *Two hours credit.*
This course will be given by a non-resident expert insurance accountant and actuary. It is open only to students who are specializing in actuarial science.

50. Mathematical Theory of Statistics. Introductory Course. *Two hours credit.* Elect as Mathematics 50. Assistant Professor CARVER.
This course deals with the elementary theory and applications of mathematical statistics, and will include a study of such topics as averages, measures of dispersion, and coefficients of correlation.

51. Introduction to the Mathematical Theory of Interest. *Three hours credit.* Elect as Mathematics 51. Professor GLOVER.
The aim of this course is to explain and illustrate the application of mathematics to financial transactions to such an extent as may be of interest and value to the general student.
It must be preceded by Course 1 (or 1E).
The attention of students who desire to specialize in statistical and actuarial mathematics is called to a note concerning the arrangement of their work in this Announcement under Mathematics.

52. Introduction to the Mathematical Theory of Insurance. *Three hours credit.* Elect as Mathematics 52. Professor GLOVER.
Course 52 is open to those who have completed Courses 1 (or 1E) and 51 in Mathematics.

56. Advanced Mathematical Theory of Interest and Life Contingencies (II). *Four hours credit.* Elect as Mathematics 56. Professor GLOVER.

60. Mathematical Theory of Statistics. Advanced Course. *Two hours credit.* Elect as Mathematics 60. Mr. BARNARD.

68. Seminary in Casualty Actuarial Theory. *Three hours credit.* Elect as Mathematics 68. Assistant Professor CARVER.

SUMMER SESSION OF 1921

1*s*. Elements of Political Economy I. Principles. *Four hours credit.* Dr. HAUHART, and Mr. J. P. ADAMS.

1*as*. General Economics. *Two hours credit.* Mr. LUBIN.

3*s*. Labor Problems. *Two hours credit.* Mr. LUBIN.

6*s*. Railway Problems. *Two hours credit.* Mr. J. P. ADAMS.

9*s*. Banking. *Two hours credit.* Assistant Professor CALHOUN.

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10*s*. Money and Foreign Exchange. *Two hours credit.* Assistant Professor CALHOUN.

15*s*. Corporations. *Two hours credit.* Professor SHARFMAN.

31*s*. Marketing. *Two hours credit.* Professor GRIFFIN.

33*s*. Foreign Trade. *Two hours credit.* Professor GRIFFIN.

37*s*. Corporation Finance. *Two hours credit.* Professor SHARFMAN.

38*s*. Principles of Accounting I. *Four hours credit.* Professor PATON.

29*s*. Principles of Accounting II. *Four hours credit.* Assistant Professor SCHMITT.

43*s*. Auditing Theory and Practice. *Two hours credit.* Assistant Professor SCHMITT.

Sociology

Work in Sociology should begin with Course 19, which is now given in both semesters. It is open to sophomores only in their second semester; that is, to those who have about forty-five hours credit.

The courses in applied sociology are in close relation to the social agencies carrying on practical work in Detroit, which afford facilities, especially to graduates, for such studies as are practicable only in a large city. Additional credit is given for field work in connection with some of the courses.

See suggestions on page 165 regarding elections for students desiring to prepare for mental testing in social clinics.

CONSULTATION HOURS.—At the opening of each semester, to advise with students regarding elections, 10 to 12, Room 205, Ec.

FIRST SEMESTER

19. Principles of Sociology. Lectures, quiz, and thesis. *Four hours credit.* Lectures and recitations. Professor COOLEY, Mr. HOLMES, and Mr. FINK.

Sophomores may not elect this course until their second semester; that is, when they have about forty-five hours credit.

Senior students, or juniors who are taking one of the combined curricula, may, by special permission, elect it as 19*a*, *three hours credit*, without the quiz.

This course aims at a systematic study of the underlying principles of social science. The general plan followed is to begin with personal relations in their simplest and most direct form, proceeding thence to the more complex forms of association. Cooley's *Human Nature and the Social Order* and *Social Organization* are used.

Each student is required to write a thesis, which must be based in part on personal observation.

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19*g*. Principles of Sociology for Graduate Students. The lectures are the same as for Course 19. A special quiz section is conducted by Professor COOLEY. The thesis is expected to be of higher grade than in the undergraduate course.

28. Criminology. *Three hours credit.* Lectures and recitations. Professor WOOD.

This course deals with the development of criminological theory, individual and social factors in crime, modern methods in the treatment of criminals, and the causes and treatment of juvenile delinquency. It must be preceded or accompanied by Course 19.

In connection with this course visits will be made to prisons, reformatories, and other institutions that relate to problems of delinquency. When such visits are arranged it is expected that members of the class go. Members of the class are permitted to attend the psycho-pathological clinic held in connection with classes in the Medical School.

UNIVERSITY CREDIT FOR FIELD WORK.—In connection with courses of a practical character it will be possible for a few advanced students to obtain additional credit for field work done under the supervision of one of the Detroit social agencies, such as the Associated Charities or the Children's Aid Society. Three hours a week, exclusive of the time spent in travel between Ann Arbor and Detroit, continued during a semester, will entitle the student to one hour of University credit. The great demand at the present time for social workers with experience makes it of advantage to students looking to social work as an occupation to get as much practical experience as they can in connection with their class work in the University.

Students wishing such credit must make definite arrangements with the instructor in charge at the beginning of the semester, and report to him as often as every other week. It must also have been regularly elected.

3. Labor Problems. *Three hours credit.* Mr. LUBIN.
(See under Political Economy.)

26. The Family. *Two hours credit.* Professor WOOD.

This course treats of the development of the family as a social institution; the structure of the primitive family and its relation to early social organization; kinship and marriage systems; the effect of economic progress upon the family in early times; the family in early times; the family in the modern era; its relation to the state and to economic and religious institutions; factors in contemporary problems of the family. Lectures, assigned readings, and thesis.

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22. Rural Sociology. *Two hours credit.* Mr. HOLMES.
The purpose of this course is to present rural life, not as a thing by itself, but as a phase of the general social life. The interdependence of city and country is considered. The various forces that are operating to remake the occupation of agriculture, and the community life of rural people are discussed. Some attention is given to the problems that are peculiar to country institutions such as the church and the school.
This course must be preceded or accompanied by Course 19.

23. Seminary in Principles of Social Work. *Two hours credit.* Professor WOOD.
This course is intended for those who mean to follow some phase of social work as a profession. Students are required to select some topics with the approval of the instructor, and to prepare upon this topic a series of papers to be read and discussed in the class room. Special permission must be obtained before electing the course. Graduate students may be assigned additional work and receive *three hours credit.*

24. Social Process. *Two hours credit.* Professor COOLEY.
An advanced course in psychological sociology intended for those who, in Course 19, have shown aptitude for such work. Cooley's *Social Process* and perhaps other texts will be used. Special permission must be obtained before electing it.

25. Seminary in Social Theory. Intended especially for candidates for the Doctor's degree. *Two hours credit.* Professor COOLEY.

SECOND SEMESTER

19. Principles of Sociology. Lectures, quiz, and thesis. *Four hours credit.* Lectures and recitations. Professor COOLEY, Mr. HOLMES, and Mr. FINK.
This is a repetition of the Course 19 given in the first semester. It is open to sophomores, but in no case to freshmen. Senior students, or juniors who are taking one of the combined curricula, may, by special permission, elect it as 19*a*, *three hours credit,* without the quiz.
For description, see under first semester.

19*g*. Principles of Sociology for Graduate Students. The lectures are the same as for Course 19. A special quiz section is conducted by Professor COOLEY.
The thesis is expected to be of higher grade than in the undergraduate course.

21. Social Evolution. *Two hours credit.* Mr. HOLMES.
The origin and development of social institutions are considered for the purpose of making clear the organic unity of society.

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Some attention is devoted to heredity and related topics of fundamental interest. The origin of man, and of race, and the evolution of various human institutions such as language, law, religion, the family, and the state, are considered.

This course must be preceded or accompanied by Course 19.

27. Immigration. *Two hours credit.* Mr. HOLMES.

The purpose of this course is to give the student an understanding of the problems connected with the influx of great numbers of foreigners into our midst. The racial and national elements among our immigrants, the occupations they enter, their mode of living, their influence in the formation of classes, and what their "assimilation" involves, are some of the topics discussed.

This course must be preceded or accompanied by Course 19.

29. Community Problems. *Two hours credit.* Professor WOOD.

This course presents a survey of community problems, and of public and private agencies that have developed in their solution. Emphasis is laid upon the growth of the community consciousness, and upon the endeavor to standardize community life in accordance with it. Among the topics discussed are: housing, city-planning, recreation, Americanization, public health, and the organization of social forces making for welfare.

Lectures, assigned readings, class discussion. Each student is required to prepare a paper upon some subject within the field.

This course must be preceded or accompanied by Course 19.

See note regarding field work in connection with Course 28.

30. Problems of Poverty. *Three hours credit.* Professor WOOD.

This course presents in a systematic way the facts concerning poverty, discusses the underlying individual and social causes of destitution, and the methods which society has adopted for its amelioration or elimination. The course begins with a discussion of the feeble-minded, insane, inebriates, and other classes of the unfit or inefficient. Survey is then made of some of the more objective causes of poverty, such as sickness and unemployment. The attention of the student is directed to modern methods for the care of dependent classes, and students will be required to visit local and state institutions when practicable.

This course must be preceded or accompanied by Course 19.

See note regarding field work in connection with Course 28.

23*a*. Seminary in Principles of Social Work. *Two hours credit.* Professor WOOD.

This course is intended for advanced students who are preparing to follow some phase of social work as a profession. Each

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student is assigned a special line of study on which he makes a series of reports. Special permission is required before electing the course. Graduate students may be assigned additional work and receive *three hours credit.*

See note regarding field work in connection with Course 28.

24. Social Process. *Two hours credit.* Professor COOLEY.
This is an advanced course in psychological sociology (the same as that offered in the first semester), intended for those who, in Course 19, have shown aptitude for this line of work. Cooley's *Social Process,* and perhaps other texts, will be used. Special permission must be obtained to elect it.

25*a*. Seminary in Psychological Sociology. Advanced study of theory. Intended especially for candidates for the Doctor's degree. *Two hours credit.* Professor COOLEY.

SUMMER SESSION OF 1921

19*s*. Social Organization. *Two hours credit.* Mr. HOLMES.

22*s*. Rural Sociology. *Two hours credit.* Mr. HOLMES.

27*s*. Immigration. *Two hours credit.* Mr. HOLMES

28*s*. Criminology. *Two hours credit.* Professor WOOD.

29*s*. Community Problems. *Two hours credit.* Professor WOOD.

EDUCATION

(GROUP III)

GENERAL STATEMENT.—Course 7 in Psychology is prerequisite to work in Education. It should be taken in the sophomore year. This course does not count towards the Teacher's Diploma.

The aims of the courses in Education are:

1. To offer to prospective high school teachers, normal school teachers, principals, and superintendents the necessary technical training for their profession.

2. To present educational history and problems in their more philosophic and scientific aspects so as to be of value to all University students, whether they intend to become teachers or not.

3. To offer to mature students and to teachers of experience, who may wish to elect work in Education as a major or minor subject, direction and facilities leading to higher degrees.

The courses are arranged with reference to five fairly distinct phases of education, the historical, the psychological, the administrative, the experimental, and the industrial.

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REQUIREMENTS FOR ADMISSION.—Two years of academic preparation are prerequisite to work in Education. This requirement may be waived in special cases.

INTRODUCTORY COURSES.—Course A is a prescribed introductory course and must precede or accompany other courses in Education. It should be pursued either the first or second semester of the junior year. Courses 1, 2, 5, and 46 are elective introductory courses and may also be pursued in the junior year. All other courses, except by special permission of the head of the department, are open only to seniors, graduate students, and prospective superintendents and principals.

SUPERINTENDENTS AND PRINCIPALS.—Students looking forward to superintendencies and principalships should pursue, in addition to the work required for a teacher's diploma, courses in advanced administration, including a course in tests and measurements and in experimental education.

OBSERVATION.—Arrangements have been made between the University and the Public Schools of Ann Arbor whereby students in Education are given opportunity to study methods of teaching the various subjects of the curricula in the high school. Students seeking a teacher's diploma are classified into groups and required to observe expert teaching of their major and minor subjects. Observation is accompanied by written reports, conferences, and collateral reading.

TEACHER'S DIPLOMA.—Candidates for the Teacher's Diploma are required to complete eleven hours of credit in this department, including Courses A and 4 (*a, b, c, d, e, f, g, h,* or *i*). Advanced credit from other universities or from colleges or normal schools will be granted toward such diploma as consideration of individual cases may warrant. No credit will be given for experience in teaching.

GRADUATE COURSES.—Courses leading to the Master's or Doctor's degree are offered for advanced students in Education. These courses must be preceded by Course A and two other courses, or the equivalent of such courses.

DEPARTMENTAL CONFERENCE.—All graduate students majoring in Education meet with the departmental staff every alternate Monday evening from 7 to 9 o'clock. (No credit.)

SATURDAY CLASSES.—Saturday classes will be arranged for teachers, principals, and superintendents now in service if there is sufficient demand for such work. See Courses 58 and 61, outlined below. For specific information pertaining to this work, address the head of the department of Education, Ann Arbor, Michigan.

CONSULTATION HOURS.—The instructors in this department will have consultation hours as follows:

Professor WHITNEY, 10 to 12 daily during registration week. Room 102, T. H.

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FIRST SEMESTER

A. Introductory Course. Lectures, readings, reports, discussions. *Two hours credit.* Professors WHITNEY and EDMONSON.

This course aims to give the beginning student of Education an acquaintance with the general field as a fundamental basis for further study and investigation. Among the topics treated are: meaning of education; cultural, vocational, and recreational education; organization and status of public education; special aims of elementary, secondary, and higher education; programs of study; legal, social, and professional status of teachers; certification of teachers; characteristics of childhood and adolescence; education literature; education associations; professional courses in Education in the University.

This course is prerequisite to all other courses in Education for all students without teaching experience.

I. Historical Courses.

1. History of Ancient and Mediæval Education. Lectures, assigned readings, papers, and discussions. *Two hours credit.* Professor JACKSON.

This course will trace the development of educational theory and practice in its relation to the political, social, religious, and intellectual conditions of the periods treated. It will seek in connection with this background to develop the meaning in the social process of the aim, subject matter, method, and organization of education, and thus provide a sound basis for appreciation and criticism of present educational conditions.

27. The history of Education in the United States. *Two hours credit.* Professor JACKSON.

This course aims to consider the more important present-day problems in the organization, administration, and adjustment of public education in the United States in the light of their historical development.

38*a*. Seminary in the History of Education. *Two hours credit.* Professor JACKSON.

Intensive study of assigned topics in the history of education, and discussion of written reports presented. Open to graduates and seniors.

II. Theoretical Courses.

5. Psychology of Education. Lectures, assigned readings, reports, and discussions. *Two hours credit.* Professors WHIPPLE, BERRY, and JACKSON.

The aspects of psychology that possess educational significance.

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Emphasis on the nature of mental constitution—mental inheritance, instinctive tendencies, individual differences—and the possibilities and limitations of modifying mental constitution by educational agencies.

Open to juniors and seniors.

19. Mental Tests. *Two hours credit.* Professor BERRY.

Nature and purpose of mental tests; relationship between mental and physical traits; analysis of mental constitution; technique of testing; principles of test construction; individual and group tests. Special attention will be given to the Binet, Army, Otis, Pressey, and National Research Council tests as a means of classifying school children. This course is intended for superintendents, graduates, and others specially qualified.

34*a*. Seminary in Educational Psychology. *Two hours credit.* Professor WHIPPLE.

For advanced students. Intensive study of some aspect of educational psychology.

Enrollment by consent of the instructor.

45*a*. Special Studies in Educational Psychology. *Credit to be arranged.* Professor WHIPPLE.

For qualified students who wish to undertake minor investigations, whether experimental or non-experimental, in some phase of educational psychology. Each student will take his own problem and his work will be graded by individual conferences with the instructor.

Enrollment by consent of the instructor.

51. Modern Methods of Teaching. *One* or *two hours credit.* Professor COURTIS.

A discussion of the philosophy, psychology, and educational experimentation that has changed methods of teaching, with special reference to the problem, the project, and the unit-task methods applied to content and to drill subjects. Assignments of extra readings and reports will constitute the work for the second hour of credit.

52*a*. Introduction to Educational Measurements. *Two hours credit.* Professor COURTIS.

A course for beginners designed to give educational workers the point of view, the knowledge, and the skill necessary to apply scientific methods to the study and improvement of teaching. It will involve both lectures and laboratory exercises, and will cover (1) statistical and scientific methods in their application to education; (2) a knowledge of existing tests and scales for elementary and high school subjects; (3) a brief review of recent surveys and educational literature in the field of meas-

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urement; (4) the uses of measurement as an aid to administration, supervision, teaching, and special care of individual children; (5) measurement of the efficiency of educational processes, with emphasis mainly upon the subjects of writing, spelling, and arithmetic.

It is recommended that this course be followed in the second semester by Course 52*b*.

III. Administrative Courses.

13. Secondary Education. Introductory Course. *Two hours credit.* Professors EDMONSON and DAVIS.

The aim of this course is to give a practical introduction to the administrative, instructional, and personal problems incident to the work of the beginning teacher. Among the topics treated are: discipline; the technique of the recitation—*i. e.,* lesson assignment, questioning, drill, teaching pupils how to study; examinations; the uses of texts and of supplementary books; the making of reports and records; extra classroom duties of teachers; and the personal relation of teachers to the supervisory officers, the pupils, and the community.

Open to seniors without teaching experience or normal school training.

16*a*. School Administration. *Three hours credit.* Professor WHITNEY.

This course is designed for those who have had teaching experience and who are looking forward to positions as principals, supervisors, or superintendents; others may be admitted by permission. It aims to discuss the chief problems involved in the organization and management of city school systems.

32. High School Administration. *Two hours credit.* Professor EDMONSON.

This course is designed to meet the needs of experienced teachers and prospective superintendents and principals who desire to make a detailed study of the general problems of organization and administration of the high school. Among the topics considered are: the aim of the secondary school; the supervision of classroom work; educational and vocational counseling; problems of discipline; the control of student activities, etc.

Open to students with teaching experience.

48*a*. Seminary in the Administration of Secondary Schools. *Two hours credit.* Professor DAVIS.

This seminary is intended for graduate students desiring to pursue research study in the field of high school administration. The more significant problems of the administration of secondary schools will be investigated analytically and constructively by the class as a unit, and in addition each student will be

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expected to select a topic for special investigation and carry forth his research under the direction of the instructor.

Seniors may, by permission, also be admitted to this course.

50. The Junior High School. *Two hours credit.* Professor DAVIS.

This course will seek to discover the conditions and motives which have produced the junior high school; to sketch the historical development of the reform; to consider the essential educational and administrative principles which must determine its future growth; to outline the essential elements of the program of studies and the curricula within it; to consider the best modes of school discipline and instruction which must operate in its work; and to formulate a concrete plan of procedure in inaugurating and perfecting the entire reform movement.

Open to senior and graduate students.

57. Secondary Education. Advanced Course. *Two hours credit.* Professor DAVIS.

This course is designed primarily for teachers of experience, high school principals, and superintendents who desire to consider the larger problems of classroom instruction. It is also open to graduate students without teaching experience and to seniors with normal school training. While the course deals with some of the topics treated in Course 13, it seeks to consider them in a more thoroughgoing manner than is done in the elementary course. Among the topics treated are: the broadening purposes of high school instruction; bases of economy in learning; supervised study; how and what to mark; standard tests of high school subjects; examinations; certificating high school teachers; and agencies of personal growth in service.

IV. Industrial Education.

In addition to the courses outlined below, courses in "Trade Analysis," "Methods of Teaching Shop Subjects," "Theory and Practice of Teaching Related Subjects," and "The Compulsory Part-time School" will be given in Detroit and Grand Rapids as needs may require. For further information concerning these courses, consult Assistant Professor E. LEWIS HAYES or Professor CLEO MURTLAND, of this department, at Cass Technical High School, Detroit, or Professor THOMAS DIAMOND, care of Board of Education, Grand Rapids; or write to Professor GEORGE E. MYERS at the University.

61. Administration of Vocational Education. *Two hours credit.* Alternate *Saturdays.* Professor MYERS.

This course aims to meet the needs of those upon whom rests responsibility for taking the lead in vocational education in

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their respective communities. Among the topics considered are: the State Board in Charge of Vocational Education, its organization and relation to local boards of education; determining local needs; laying out an adequate program; standards required in order to obtain Federal and State aid provided under the Smith-Hughes Law; selection and supervision of teachers; placing graduates and other vocational students; follow up work; means of keeping the schools or classes in touch with changing conditions in industry.

62. An Introduction to Vocational Education. Lectures, discussions, and reports. *Two hours credit.* Professor MYERS.

This course aims to give the student an introduction to the field of vocational education, with special reference to industrial education. Among the topics considered are: definition of terms vocational education, industrial education, pre-vocational education, practical arts, industrial arts, household arts, manual training; relation of vocational education to liberal education; social factors involved in vocational education; responsibility of society, of the employer, and of the worker; how vocational education has been given in the past; failure of past methods under modern industrial and economic conditions; important factors in modern industrial organization affecting the problem —specialization of processes, standardization of product, piece work and bonus systems, efficiency movement; corporation schools; Y. M. C. A. schools and classes; place of vocational education in a comprehensive program of public education; types of vocational schools and classes and the functions of each.

68. The Compulsory Part-time School. *Two-hours credit.* Professor MYERS.

This course aims to meet the needs of those who are to teach or supervise in the part-time schools which Michigan cities are required to establish under the new law. Among the topics treated are: origin and development of part-time education; why made compulsory; purposes and functions of part-time schools; the Michigan law; determining the needs of a given community; classification of part-time pupils; the curriculum; methods of teaching; follow-up work; vocational counseling; dealing with employers.

SECOND SEMESTER

A. Introductory Course. Lectures, readings, reports, discussions. Professor ————.

This is a repetition of Course A of the first semester.

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I. Historical Courses.

2. History of modern Education. Lectures, assigned readings, papers, and discussions. *Two hours credit.* Professor JACKSON.

This course is similar to Course 1 in aim and method of treatment. It deals with the progress of society and related educational problems from the Renaissance to the present time, and attempts to show the origin and evolution of present theory and practice in education.

27. The History of Education in the United States. *Two hours credit.* Professor JACKSON.

This course aims to consider the more important present-day problems in the organization, administration, and adjustment of public education in the United States in the light of their historical development.

38*b*. Seminary in the history of Education. *Two hours credit.* Professor JACKSON.

This is a continuation of Course 38*a* of the first semester. Open also, with permission of the instructor, to seniors and graduate students who have not pursued Course 38*a*.

II. Theoretical Courses.

5. Educational Psychology. Lectures, assigned readings, reports and discussions. *Two hours credit.* Professors WHIPPLE, BERRY, and JACKSON.

[6. Principles of Education. Readings, reports, discussions. *Two hours credit.* Professor WHITNEY.

This course is designed to meet the needs of those students who desire to secure broad backgrounds of educational thought and practice. Special consideration will be given to the constructive aims and methods of education as implied in a democratic society. Omitted in 1920-1921.]

33. Psychology and Education of Exceptional Children. *Two hours credit.* Professor BERRY.

Extent and significance of individual differences in relation to education and society; classification of exceptional children; means of selection; psychological characteristics; educational possibilities; subject matter and methods of instruction; advantages and disadvantages of the special class or school; history of subnormal and supernormal children after leaving school.

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34*a*. Seminary in Educational Psychology. *Two hours credit.* Professor WHIPPLE.

For advanced students. Intensive study of some aspect of educational psychology—this year "The Psychology of Character." Enrollment by consent of the instructor.

45*b*. Special Studies in Educational Psychology. *Credit to be arranged.* Professor WHIPPLE.

This is a continuation of Course 45*a* of the first semester. Other students, however, who have not pursued Course 45*a* may, by permission of the instructor, be admitted to the course.

51. Modern Methods of Teaching. *One or two hours credit.* Professor COURTIS.

This is a repetition of Course 51 of the first semester.

52*b*. Introduction to Educational Measurements. *Two hours credit.* Professor COURTIS.

This is a continuation of Course 52*a*, given the first semester, with emphasis here mainly upon the subjects of composition, reading, and geography.

58*b*. Educational Problems. *Two hours credit. Alternate Saturdays.* Professor BERRY.

The problem selected for this semester is the psychology and education of school children of average intelligence who have special abilities or disabilities.

This course is primarily intended for teachers, principals, and superintendents in service.

III. Administrative Courses.

4*a*. Observation and Special Methods in Greek and Latin. *One hour credit.* Professor CRITTENDEN.

Lectures, readings, conferences, and critiques.

Practical application of the principles of class management; aims and values of the classics; the courses of study; outlines of the work as regards quantity, quality, and method; special consideration of the stress to be laid upon such features as pronunciation, vocabulary, syntax, translation, etc.; examination of some of the text-books now in use.

Twenty hours of high school observation are required of each student.

Not open to juniors.

[4*b*. Observation and special Methods in German. *One hour credit.* Assistant Professor HILDNER.

Lectures, conferences, reports, readings, and discussions.

The aim of this course is to consider principles of the recitation unit, to give opportunity for the observation of these principles

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as applied in practice, and to consider the principles underlying the teaching of modern language. Such problems as text-books, pronunciation, proper use of translation will be given careful attention.

Twenty hours of high school observation are required of each student. Omitted in 1920-1921.]

4*c*. Observation and Special Methods in English. *One hour credit.* Professor RANKIN.

Lectures, conferences, and collateral readings.

The aim of this course is to consider the fundamental principles of a class recitation and to offer to students in Education opportunity to observe the practical demonstration of these principles in teaching composition and literature. Careful consideration is given to formal grammar, the aims, values, and methods of teaching composition and literature, the courses of study, and such other factors as pertain to the instruction of English in the high schools. Students are required to observe twenty recitations during a semester.

Not open to juniors.

4*d*. Observation and Special Methods in History. *One hour credit.* Professor DAVIS.

Lectures, conferences, reports, readings, and discussions.

The aim of this course is to give inexperienced but prospective teachers of history an opportunity to study the special problems of the classroom and to consider the special aspects of methods involved in history teaching in secondary schools. The work will consist of lectures and exercises dealing with such topics as the aims of history teaching; the relation of history to literature, biography, and science; the sequence of the various divisions of the subject; the proportionate emphasis to be accorded different phases of history; the organization of material; the use of text-books and note-books; the use of outline maps, charts, blackboards, reference books, source material, pictures, lantern slides, and other illustrative helps; tests and examinations; reports and reviews; lesson planning; types of recitation; the art of questioning; assignment of lessons, and other topics involving the technique of the recitation.

Each student will be required to spend twenty hours during the semester observing the classroom work in the Ann Arbor High School.

Not open to juniors.

4*e*. Observation and Special Methods in Mathematics. *One hour credit.* Professor KARPINSKI.

Lectures, readings, and conferences.

The application of the principles of class management to concrete

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situations; the aims and values of mathematical study; the course in mathematics for the secondary school; classification and critical consideration of special methods and modes; comparison of text-books. Twenty hours of high school observation during the semester.

Not open to juniors.

4*f*. Observation and Special Methods in Botany. *One hour credit.* Professor POLLOCK.

Lectures, conferences, reports, and discussions of observations. Twenty hours of observation during the semester of Botany teaching in the Ann Arbor High School. One hour per week for conference.

In the conference hour there will be considered: First, the laboratory and its equipment; then the educational value of the natural sciences, how this value is to be obtained, and its relation to the method of teaching the subject. Lastly, a course of study for Botany will be discussed in detail, with reasons for the choice of material. A detailed outline for a number of field trips will be worked out. The phases of botany especially valuable as a basis for agriculture will be indicated.

Not open to juniors.

4*g*. Observation and Special Methods in Zoölogy. *One hour credit.* Assistant Professor LA RUE.

Lectures and conferences on such topics as the following: The aim and value of the zoölogical course in secondary schools, the content of the course, literature, the planning of the laboratory, choice of apparatus, purchase of supplies, etc.

Twenty hours of observation work with reports on the teaching of Zoölogy in the Ann Arbor High School will be required.

For practical training in laboratory methods prospective teachers of Zoölogy should elect Courses 18 and 18*a* in Zoölogy in the same year with this course or prior to it.

Not open to juniors.

4*h*. Observation and Special Methods in Physics. *One hour credit.* Assistant Professor RICH.

This course is open only to seniors who are completing the requirements for recommendation as teachers in Physics. See under Physics.

Lectures, conferences, readings, reports, discussions, on such subjects as the relative emphasis to be placed on the various parts of a high school course in Physics; the choice and the planning of laboratory experiments and the correlation of laboratory work with text-book work; the comparison of various laboratory methods, note-books, and manuals; the selection and care of apparatus for lecture table and laboratory; the advantages

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and the disadvantages of separate courses for boys and girls; the use of supplementary material, "household" physics, "practical" physics, etc.

Twenty hours of high school observation during the semester.

Not open to juniors.

4*i*. Observation and Special Methods in French. *One hour credit.* Professor CANFIELD.

Lectures, readings, conferences, and reports.

Twenty hours of high school observation are required of each student.

Not open to juniors.

13. Secondary Education. Introductory Course. *Two hours credit.* Professor DAVIS.

This course is a repetition of the one given the first semester.

14. Social Education. Lectures, readings, theses, reports. *Two hours credit.* Professor WHITNEY.

A study of the school as a social factor in its relation to the home, the community, the state, and the church. Among the topics treated are: the social basis of education; the social extension of the school; continuation schools; school and the business world; parental schools; the juvenile court; self-governing clubs; the boy problem; education and crime; industrial education; agricultural education; athletics; course of study; six-year high school; social study period and recitation, and high school fraternities.

16*b*. School Administration. Readings, reports, discussions. *Three hours credit.* Professor WHITNEY.

This course is a continuation of 16*a*; it is opened to others of teaching experience, by permission. It aims to consider scientific methods of organization and supervision. Among the topics treated are: individual differences in their relation to retardation, elimination, and promotion of pupils; standards of efficiency; school surveys; school financing; budget making; standardization of school buildings, etc.

17. Comparative School Systems. Lectures, prescribed readings, and reports. *Two hours credit.* Professor DAVIS.

This course is designed to present the essential features of the school systems of the United States, England, Germany, and France to compare these systems with each other, and to judge of the efficiency of each in the light of their respective educational aims and national ideals. Among the topics treated are: organization, supervision, curriculum, methods of teaching, continuation schools, technical schools, universities, etc.

Open to senior and graduate students.

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18. The High School Program of Studies (Curriculum). *Two hours credit.* Professor DAVIS.

This course traces briefly the historical development of the program of studies (curriculum) in secondary schools; seeks to discover the principles of program construction; considers the criticisms directed against the existing high school programs of studies; attempts to valuate each of the subjects found today in the high school, to judge of its scope, time allotment, and position in the course, and to suggest modes of its correlation and general methods of its presentation; makes a study of typical programs; and endeavors to formulate a satisfactory program of the high schools of today.

Open to senior and graduate students.

48*b*. Seminary in the Administration of Secondary Schools. *Two hours credit.* Professor DAVIS.

Course 48*b* is a continuation of Course 48*a*. Students who have not pursued Course 48*a* may, however, by the consent of the instructor, be permitted to take this course.

IV. Industrial Education.

60. Methods of Teaching Industrial Subjects. *Two hours credit.* Professor MYERS.

This is a general course in methods for those teaching or preparing to teach in day, part-time, or evening industrial schools and classes. Among the topics treated are: preparation for the first session of the class; organizing the class; principles governing selection and arrangement of industrial teaching material; choice of problems and projects; the demonstration method; the method of illustration and the use of models, sketches, pictures, and other illustrative material; the lecture method; the experimental method; use of lesson sheets; inspecting and criticizing pupils' work; lesson planning; planning and conducting shop excursions; tests and examinations; records and reports; keeping up with changing conditions in industry.

68. The Compulsory Part-time School. *Two hours credit.* Professor MYERS.

This course aims to meet the needs of those who are to teach or supervise in the part-time schools which Michigan cities are required to establish under the new law. Among the topics treated are: origin and development of part-time education; why made compulsory; purposes and functions of part-time schools; the Michigan law; classification of part-time pupils; the curriculum; methods of teaching; follow-up work; vocational counseling; dealing with employers.

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69. Vocational Counseling. *Two hours credit.* Professor MYERS.
This course, which is planned primarily for teachers in vocational and part-time schools, should be of great value to high school and junior high school teachers. Among the topics treated are: present methods of entering occupations; social and economic waste involved; conditions and principles underlying the present situation; pre-vocational courses; self-analysis as a basis for vocational choice; English teaching as a means of presenting occupational information; special course in occupational information; psychological tests; placement in relation to vocational counseling; vocational counseling in the compulsory part-time school.

SUMMER SESSION OF 1921

I. Historical Courses

S27. The History of Education in the United States. *Two hours credit.* Professor JACKSON.

II. Theoretical Courses

S5. Psychology of Education. *Two hours credit.* Professor BERRY.

S6. Principles of Education. *Two hours credit.* Professor WHITNEY.

S19*a*. Introduction to Mental Testing. *Two hours credit.* Professor THURSTONE.

S19*b*. Individual Intelligence Testing. *Two hours credit.* Professor JACKSON.

S19*c*. Group Intelligence Testing. *Two hours credit.* Professor WHIPPLE.

S19*d*. Advanced Mental Testing. *Two hours credit.* Professor THURSTONE.

S33. Psychology and Education of Exceptional Children. *Two hours credit.* Professor BERRY.

S45. Minor Problems in Educational Psychology. *Credit to be arranged.* Professor WHIPPLE.

52*a*. Introduction to Educational Measurements. *Two hours credit.* Professor COURTIS.

S53*a*. Tests and Scale Construction. Advanced Course. *Two hours credit.* Professor COURTIS.

S56*a*. Psychology of the Common Branches. *Two hours credit.* Assistant Superintendent PACKER.

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III. Administrative Courses.

S12*a*. Social Education. *Two hours credit.* Professor BURNHAM.

S16*b*. School Administration. *Two hours credit.* Professor WHITNEY.

S32. High School Administration. *Two hours credit.* Superintendent SEXTON.

S41*a*. Administrative Problems of the Large High School. *Two hours credit.* Professor DAVIS.

S50. The Junior High School. *Two hours credit.* Professor DAVIS.

S57. Secondary Education. Advanced Course. *Two hours credit.* Superintendent SEXTON.

S80*a*. Rural Education. *Two hours credit.* Professor BURNHAM.

S81*a*. Principles of Method. *Two hours credit.* Superintendent BUTLER.

S82*a*. Business Management in the Public Schools. *Two hours credit.* Assistant Superintendent PACKER.

S83*a*. School and Personal Hygiene. *Two hours credit.* Director ROWE.

S84*a*. Administration of Physical Administration. *Two hours credit.* Director ROWE.

IV. Industrial Education.

S68. The Compulsory Part-time School. *Two hours credit.* Professor MYERS.

S69. Vocational Guidance and Placement. *Two hours credit.* Professor MYERS.

S70. Methods in Foremanship Training. *Two hours credit.* Supervisor SMITH, and Professor DIAMOND.

S66. Methods of Teaching Mechanical Drawing. *Two hours credit.* Mr. KEPPLER.

S65. Methods of Teaching Industrial Mechanics and Science. *Two hours credit.* Assistant Professor HAYES.

S72. The Social and Economic Background of Vocational Education. *Two hours credit.* Professor MURTLAND.

S73. Teaching General Continuation Subjects in the Part-time School. *Two hours credit.* Professor MURTLAND.

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ENGLISH

Courses 3, 3*c*, 3*d*, 5*a*, 5*b*, 6, 6*a*, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 18*a*, 19, 20, 21, 21*a*, 22, 23, 23*a*, 26, 27, 28, 30, 31, and 32 will ordinarily be found suitable for graduate students.

Courses 1 and 2 will satisfy the requirement in English in the Literary-Law curriculum and in the other combined curricula.

Students who are preparing to teach English are strongly advised to elect at least one course from the following group: 3 (Old English); 3*c* (Chaucer); 7 (Historical English Grammar). Graduate students who have had one of these courses as undergraduates are advised to elect a second course from this group in their first year of graduate study.

CONSULTATION HOURS.—During the registration period, September 20 to 24, a departmental representative, daily, 10 to 12, Room 208, T. H.

FIRST SEMESTER

1. English Literature. Historical outline, with assigned readings. *Three hours credit.* Assistant Professors HUMPHREYS, GINGERICH, and FRIES, Dr. RAYMOND, Dr. J. R. MOORE, and Mr. KUYPER.

3. Old English. *Three hours credit.* Professor S. MOORE.
This course is intended to provide students with a solid basis for the study of English grammar and the history of the English language; to give them a first-hand acquaintance with some representative prose works of the Old English period; and to prepare them to read *Beowulf* in its original form.

3*c*. Chaucer. *Three hours credit.* Professor S. MOORE.
After making a careful study of the *Prologue* and learning the essential facts in regard to the pronunciation and inflections of Chaucer's language, students will go on to the more rapid reading of about six of the *Canterbury Tales*.

4. Shakespeare. *Two hours credit.* Professors STRAUSS and TILLEY.
A critical reading of *Othello, Twelfth Night,* and *Henry V*. The plays studied are so chosen that this course may be elected with credit two years in succession. Course 4 must be preceded by Courses 1 and 2 or an equivalent.

5*a*. The English Drama before Shakespeare. *Three hours credit.* Professor TILLEY.
Lectures on the earlier forms of the drama up to Shakespeare, together with an intensive study of two of the more important plays of the period.
Open to those who have had a course in Shakespeare.

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6. English Literature from Milton to Pope. *Three hours credit.* Assistant Professor HUMPHREYS.
   A study of the rise of Classicism in English literature, and of the progress of the movement through the Restoration and Queen Anne periods.

7. Historical English Grammar. *Three hours credit.* Professor S. MOORE.
   An elementary study of the historical development of the sounds and inflections of modern English.

13. Introduction to the Poetry of Browning. *Three hours credit.* Professor STRAUSS.
   A study of selections from the *Dramatic Lyrics, Dramatic Romances, Men and Women,* and *Dramatis Personae.* The course is designed primarily for juniors and seniors.

18. The Development of the English Novel. *Three hours credit.* Professor STRAUSS.
   Open to seniors and graduate students.
   A study of the rise of the novel in England as an art form, with an attempt to discover the principle of its development.

20. Studies in Spenser, with special reference to the *Faery Queen. Two hours credit.* Professor TILLEY.
   Lectures and readings, with the consideration of special problems centering about Spenser.

[21. Seminary in English Philology. *Two hours credit.* Professor S. MOORE.
   The subject for 1921-1922 will be selected after consultation with the class from the following: Old English historical grammar; Old English dialects; Middle English historical grammar; Middle English dialects; problems in Modern English grammar. Omitted in 1920-1921.]

22. Contemporary Drama. *Two hours credit.* Dr. J. R. MOORE.
   A study of the drama of the present day, with special attention to the inter-relations of the English drama with that of the continent.

23. Middle English. *Two hours credit.* Professor S. MOORE.
   The purpose of this course is to trace the process by which Old English developed, through the stage represented by the language of Chaucer, into Modern English, and to give the student some acquaintance with the literature of the thirteenth and fourteenth centuries.
   Open to students who have had Courses 3 and 3*c* or their equivalents, and to others who obtain special permission.

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24. The English Bible, its Literary Aspects and Influence. *Two hours credit.* Assistant Professor HUMPHREYS.
The King James Version will be used in class. A leading aim of this course (together with Course 25) will be to acquaint the student with the Scripture Story as material for literary allusion and illustration. The course may be taken in connection with or following Course 1.

[26. Ben Jonson. *Two hours credit.* Professor TILLEY.
The course will consist of the critical reading of two of Jonson's representative plays, together with lectures on his relation to Shakespeare and other contemporary dramatists.
Omitted in 1920-1921.]

27. Studies in Modern English Literature. Primarily for graduate students. *Two hours credit.* Professor STRAUSS.
In 1920-1921 the subjects for study will be selected from the following: The Classical Movement; Restoration Comedy; Eighteenth Century Essayists; the Rise of Romanticism; Development of the Novel; Nineteenth Century Fiction; Browning's Major Works; Present Tendencies in the Drama.

30. Wordsworth and His Contemporaries. *Two hours credit.* Assistant Professor GINGERICH.
A considerable portion of Wordsworth's works will be read in class. Wordsworth's place in the Romantic Movement in English literature will be fully considered. Coleridge, Scott, Byron, Shelley, and Keats will be studied in relation to the Romantic Movement.

32. Milton. *Two hours credit.* Dr. RAYMOND.
A study of Milton's poetry, the major part of which will be read in class. The artistic and religious backgrounds of these works, represented by the influence of the Classics, the Scriptures, and the ideals of the Puritan movement, will be discussed.
Course 32 must be preceded by Courses 1 and 2 or an equivalent.

33. English Prose of the Victorian Era. *Two hours credit.* Dr. RAYMOND.
A study and interpretation of representative works of the following writers: Macauley, Carlyle, Newman, Ruskin, Arnold, Huxley, Pater, and Stevenson.
This course will include a general consideration of the social and intellectual movements of the Victorian age, as revealed through its prose literature.

SECOND SEMESTER

1. English Literature. Historical outline, with assigned readings. *Three hours credit.* Mr. KUYPER.
This is a repetition of Course 1 of the first semester, and is

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intended for those who, beginning the study in the second semester, wish to elect Courses 1 and 2 in chronological order.

2. English Literature. Historical outline, with assigned readings. *Three hours credit.* Assistant Professor HUMPHREYS, GINGERICH, and FRIES, Dr. RAYMOND, Dr. MOORE, and Mr. KUYPER.
Course 2 is a continuation of Course 1.

3*d*. Chaucer. *Two hours credit.* Professor S. MOORE.
The course consists of rapid reading of the work of Chaucer not read in Course 3*c*, with lectures and reports.
Open to students who have had Course 3*c* or its equivalent.

4*a*. Shakespeare. *Two hours credit.* Professor TILLEY.
A critical reading of *Hamlet*, *Winter's Tale*, and *Richard II*. (The plays studied are so chosen that this course may be elected with credit two years in succession.)

5*b*. The English Drama, from Shakespeare to the Closing of the Theatres, 1642. *Three hours credit.* Professor TILLEY.
Course 5*b* is a continuation of Course 5*a*.

6*a*. English Literature from Pope to Wordsworth. *Three hours credit.* Assistant Professor HUMPHREYS.
Course 6*a* is a continuation of Course 6. It deals with the further history of English Classicism, through the time of Johnson; with the rise and progress of Romanticism through the same period, and to the end of the Eighteenth century; and with the relation of the Eighteenth century novel to general conditions in life and literature.

8. Beowulf. *Three hours credit.* Professor S. MOORE.
Reading of the text, with study of the meter and literary characteristics of Old English poetry. Open to students who have had Course 3 or its equivalent.

9. Modern English Grammar. *Three hours credit.* Professor S. MOORE.
A study of Modern English Grammar in the light of the historical development of the language and from the point of view of the psychology of speech.

12. Shakespeare Seminary. The plays studied are: *A Midsummer Night's Dream; The Merchant of Venice; As You Like It; The Tempest; Richard III;* the two parts of *Henry IV; Henry V; Romeo and Juliet; Hamlet; Othello; King Lear; Macbeth; Coriolanus. Two hours credit.* Professor STRAUSS.
Open to seniors and graduate students. Each member of the seminary is required to present a report on one of these plays.

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13*a*. The Poetry of Browning. *Three hours credit.* Professor STRAUSS.
A study of several of Browning's major works, such as *Pippa Passes, Paracelsus, A Soul's Tragedy,* etc.
Course 13*a* should be preceded by Course 13.

14. American Literature. Authors studied: Irving, Cooper, Bryant, Emerson, Hawthorne, Longfellow, Whittier, Poe, Holmes, Thoreau, Lowell, Howells, and James. *Two hours credit.* Assistant Professor GINGERICH, and Dr. RAYMOND.
Representative works of the authors named are studied and compared with masterpieces of British authors, and an attempt is made to discover the distinctively American element.
Sections I, II, and III are designed for upperclassmen only. Sec. IV is open to graduate students only.

[16. Old English Poetry. *Two hours credit.* Professor S. MOORE.
Critical reading of the short poems embodying Germanic material, and of representative works of the cædmonian and Cynewulfian schools of Christian poetry; examinations of the literary problems connected with the texts that are read. For students who have had Courses 3 and 8. Omitted in 1920-1921.]

18*a*. Prose Fiction of the Nineteenth Century. *Three hours credit.* Professor STRAUSS.
Course 18*a* is a continuation of Course 18. Lectures, discussions, and readings in the works of Scott, Austen, Bulwer-Lytton, Disraeli, Dickens, the Brontë sisters, George Eliot, Trollope, Reade, Kingsley, Meredith, Blackmore, Hardy, Stevenson, and others. Open to students who have completed Course 18, and to others who receive permission.

[21*a*. Seminary in English Philology. *Two hours credit.* Professor S. MOORE.
This course is a continuation of Course 21. Omitted in 1920-1921.]

22*a*. Technique of the Drama. *Two hours credit.* Dr. J. R. MOORE.
A practical study of dramatic form and structure based upon analysis of modern plays and upon recent critical literature.
This course is a continuation of Course 22.

23*a*. Middle English. *Two hours credit; hours to be arranged.* Professor S. MOORE.
This course is a continuation of Course 23.

25. The English Bible, Its Literary Aspects and Influence. Assistant Professor HUMPHREYS.
Course 25 is a continuation of Course 24.

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28. Studies in Modern English Literature. Primarily for graduates. *Two hours credit.* Professor STRAUSS.
Course 28 is a continuation of Course 27.

31. Wordsworth and His Contemporaries. *Two hours credit.* Assistant Professor GINGERICH.
Course 31 is a continuation of Course 30.

SUMMER SESSION OF 1921

2*a*. Outline History of English Literature. *Two hours credit.* Dr. RAYMOND, and Dr. MOORE.

14. American Literature. *Two hours credit.* Assistant Professor GINGERICH, Dr. RAYMOND, and Dr. MOORE.

4. Shakespeare. *Two hours credit.* Professor TILLEY.

24. The English Bible, Its Literary Aspects and Influences. *Two hours credit.* Assistant Professor HUMPHREYS.

5. Chaucer. *Two hours credit.* Assistant Professor FRIES.

5*c*. History of English Drama. *Two hours credit.* Professor TILLEY.

3*a*. Anglo-Saxon. *Two hours credit.* Assistant Professor FRIES.

3*b*. History of the English Language. *Two hours credit.* Professor TILLEY.

30. Wordsworth and His Contemporaries. *Two hours credit.* Assistant Professor GINGERICH.

27*a*. Studies in Modern English Literature. *Two hours credit.* Professor STRAUSS.

32. Eighteenth Century Romanticism. *Two hours credit.* Assistant Professor HUMPHREYS.

19*a*. The Poetry of Tennyson. *Two hours credit.* Assistant Professor GINGERICH.

13*a*. Introduction to the Poetry of Browning. *Two hours credit.* Professor STRAUSS.

18*b*. The Development of the English Novel. *Two hours credit.* Dr. MOORE.

32*a*. Milton. *Two hours credit.* Dr. RAYMOND.

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FINE ARTS

The aim of the courses offered in this department is to give the student a knowledge of the origin and development of the Fine Arts throughout the ages. Together with the history of their growth are studied their principles, technique, appreciation, and criticism, and the relation of the art of the various peoples to their history, religion, literature, and daily life.

A general knowledge of history is presumed. A knowledge of Latin and Greek and ability to read French, German, and Italian will be of assistance in advanced courses.

It is strongly urged that the courses be elected in their numerical sequence. Course 1 is offered each semester and is prerequisite for all others. None of these courses are open to freshmen.

CONSULTATION HOURS.—Professor CROSS will meet students for consultation at his office in Memorial Hall, *M, W, F,* from 9:30 to 10, and at 3.

FIRST SEMESTER

1. General Introductory Course in the Fine Arts. The origin, development, and essential principles and technique of Architecture, Sculpture, and Painting, including a brief survey of their history from prehistoric times to the present. Text-book, S. Reinach's *Apollo.* Illustrated lectures, required reading, and written tests. *Three hours credit.* Professor CROSS.

   This course or its equivalent, satisfactory to the instructor is a prerequisite for all other courses in this department.

3. Greek Art. The history of the Fine Arts among the Greeks, to the Roman period, with a preliminary survey of Egyptian and Mesopotamian art. Special attention is given to the great sculptors of the Fifth and Fourth Centuries, B. C. Illustrated lectures, required reading, written tests. *Three hours credit.* Professor CROSS.

5. Italian Renaissance Art. The history of the Fine Arts in Italy in the Fifteenth and Sixteenth Centuries, with special attention to the development of Italian painting. Illustrated lectures, required reading, written test. *Three hours credit.* Professor CROSS.

SECOND SEMESTER

1. General Introductory Course. A repetition of Course 1 of the first semester. *Three hours credit.* Professor CROSS.

[4. Roman and Mediæval Art. The history of the Fine Arts in the Roman, Early Christian, Byzantine, and Mediæval periods, with special attention to Roman and Gothic architecture. Illustrated lectures, required readings, written tests. *Three hours credit.* Professor CROSS. Omitted in 1920-1921.]

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6. The Renaissance Outside of Italy. The history of Spanish, French, Flemish, Dutch, German, and English Renaissance Art (including the Nineteenth Century). Illustrated lectures, required reading, written tests. *Three hours credit.* Professor CROSS.

8. American Art. The history of the Fine Arts (architecture, sculpture, and painting) in the United States from Colonial times to the present. Illustrated lectures, required readings, written quizzes. *Three hours credit.* Professor CROSS.

SUMMER SESSION OF 1921

1*a*. General Introductory Course in Fine Arts. *Two hours credit.* Professor CROSS.

20*a*. Oriental Art. *Two hours credit.* Professor CROSS.

FORESTRY

Most of the courses in Forestry are intended primarily for the training of professional foresters, but are open to all students of the University who are properly prepared to take them and who obtain the permission of the professor in charge.

However, a certain number of courses are now offered by the Forestry department that are non-technical in character and are open to all students of the University *without special preparation*. The aim of these courses is to enable students in other departments to become informed with regard to certain fundamental phases of forestry work and forestry conditions in their relation to our national business and general welfare. These general courses are 21, 22, 23, 24, and 24*a*.

All Forestry courses are given in the Natural Science building.

(For further information regarding Forestry courses, see the special Forestry Announcement.)

CONSULTATION HOURS.—Throughout registration week, September 20 to 24, Professor ROTH, or his representative, will be in Room F 214, N. S., 10 to 12 daily, to consult with students and advise them in their elections.

FIRST SEMESTER

1. Introduction to Forestry. *Two hours credit.* Lectures. Professor ROTH.

A general presentation of the subject, its history, objects, methods, as well as its economic importance.

Prerequisite: Botany 1.

3. Timber. *Two hours credit.* Lecture and laboratory. Assistant Professor WATSON.

Continuation of Course 4.

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5. Silvics. *Four hours credit.* Three lectures and one laboratory or field period. Professor YOUNG.
Life history of the stand of trees in the forest from its start to maturity and death. The factors of site (climatic, soil, physiographic, and biotic) in their relation to the occurrence of forest and the development of forest types and stands of timber. The reaction of the stand on the site. Study of the principal forest types in the several regions of the United States. Field methods for the study of site conditions, of the silvical characters of species and their behavior in stands.
Prerequisites: Botany 13 and 14, and Forestry 1 and 6.

7. Forest Mensuration. *Four hours credit.* Two lectures and two laboratory or field periods. Assistant Professor CRAIG.
Timber estimating and scaling; methods of surveying and mapping of forest lands; methods used in forest investigations for measuring volumes of single trees and yield in volume of entire stands.
Prerequisites: Surveying 12 and 13, Botany 13 and 14, Mathematics 1 and 2.

9. Silviculture. *Four hours credit.* Three lectures and one field period. Professor YOUNG.
Study of natural reproduction of the forest. Thinning practice and the care of stands to improve their condition and growth. The various methods of reproduction and care are considered especially with reference to their application to conditions in the United States and Canada. Instruction in marking trees to be cut in thinnings and final harvest.
Prerequisites: Forestry 5 and 6. Geology 15 must precede or accompany this course.

11*a-c*. Special or Advanced Work in Forestry. This course may be elected only by special permission of the professor in charge. *Two, three,* or *four hours credit.*
This course is elected as:
11*a*. Management. Professor ROTH.
11*b*. Silviculture and Timber. Professor YOUNG.
11*c*. Protection and Utilization. Assistant Professors CRAIG and WATSON.

13. Forest Utilization. *Three hours credit.* Lectures and field work. Assistant Professor CRAIG.
Methods of realizing upon forest resources. Uses of timber, points of production and market. Methods of manufacture, costs and values. Minor forest products. Logging and sawmilling. Stumpage valuation. Timber sale contracts and sale administration. Miscellaneous forest uses.
Prerequisites: Surveying 12 and 13 and Forestry 1.

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15. Forest Management. *Four hours credit.* Lectures. Professor ROTH.

Forest regulation; surveys and reports of forest properties; preparation and revisions of forest working plans. Division of forest into working units; size, form, use, and importance of the working section, the lot, or compartment, and the cutting series. Considerations entering into the choice of species, methods of silviculture, choice of rotation, regulation of cut, or harvest; the lines and extent of improvements, methods of utilization and protection, and the relation of these principal lines of work as they affect the working plan. The Normal Forest. Detailed plans and bookkeeping in Forestry.

Prerequisites: Forestry 7, 8, 9, 10, 13, and 14.

19. Forest Protection. *Two hours credit.* Assistant Professor WATSON.

Enemies of the forest as they affect the work of the forester. Forest laws, trespass and trespass procedure. Occurrence, prevention, and suppression of forest fires. Rating of protection costs to hazards and values. Planning and operating fire preventing and fire fighting systems. Preventive and protective measures in attack by insects and fungi. Meteorological and other damages.

Prerequisites: Forestry 4, 9, and 10; Botany 17.

21. Conservation with Special Reference to the Forest Resources of the United States. *One hour credit.* Lectures. Assistant Professor WATSON.

Development of the Public Land Policy of the United States; characteristics and status of the natural resources; forest products and their relation to our industries; forest influences on climate and water supply; methods by which the forester handles timber properties.

The treatment of the subject in general and from the standpoint of public economy. Open to all students.

23. Forestry for Engineers. *Two hours credit.* Professor YOUNG.

Identification of commercial woods. Characteristics of our native woods and their suitability for construction. Methods of seasoning and storing timber. Wood preservation. Grading rules and specifications used in buying and selling timber. Economic importance of forests. Methods of planting for watershed protection, for snowbreaks and windbreaks.

This course has no prerequisites and is open to all students.

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SECOND SEMESTER

2. Introduction to Forestry. *Two hours credit.* Lectures. Professor ROTH.

Continuation of Course 1.

Prerequisite: Botany 1.

4. Timber. *Two hours credit.* One lecture and one laboratory period. Assistant Professor WATSON.

Structure and identification of woods used for timber. Study of mechanical properties (strength and resistance) by actual tests. Methods of seasoning and preservative treatment of woods.

Prerequisites: Physics 1, Botany 13 and 14.

6. Dendrology. *Two hours credit.* Lectures and laboratory. Assistant Professor WATSON.

Study of the more important species of forest trees; development and growth of the individual tree; requirements as to soil, climate, and light; resistance to the ordinary injuries (insects, fungi, storm, drought, etc.); value and use of the wood; usual occurrence in the wild woods, and the share of any species in the formation of types in the several forest regions of our country. Classification and identification of tree species.

8. Forest Mensuration. Continuation of Course 7. *Four hours credit.* Two lectures and two field periods. Assistant Professor CRAIG.

Prerequisite: Forestry 7.

10. Silviculture. *Four hours credit.* Three lectures and one field period. Professor YOUNG.

Study of artificial reproduction of the forest. Methods of sowing and planting forest. Nursery practice; the collection, extraction, cleaning, testing, and storage of tree seeds; the growing of bare lands.

All of the operations of nursery and planting work are performed by the student in the course.

12*a-c*. Special or Advanced Work in Forestry. This course may be elected only by special permission of the professor in charge. *Two, three,* or *four hours credit.*

This course is elected as:

12*a*. Management. Professor ROTH.
12*b*. Silviculture and Timber. Professor YOUNG.
12*c*. Protection and Utilization. Assistant Professors CRAIG and WATSON.

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14. Forest Utilization. Continuation of Course 13. *Three hours credit.* Assistant Professor LOVEJOY.

Prerequisite: Forestry 13.

16. Forest Management. *Four hours credit.* Professor ROTH.

Forest valuation; appraisal of land and timber; relation of capital and income; per cents made in forestry; income value of soil as a measure of value for land and for forest operations (forest statics); bases of forest taxation, insurance, and for comparisons in the right use of land; forest history and policies abroad and in the United States; forest legislation, national and state, with special reference to the organization of Forestry Commissions and other administrative bodies, and the definition of their authority and work. Especially designed for those interested in proper development of state work in forestry.

Prerequisite: Forestry 15.

18. National Forest Administration. *Two hours credit.* Lectures. Assistant Professor WATSON.

History of the public land policy of the United States. Public land laws and their administration. Land classification. Development of the National Forest policy. Organization and work of the United States Forest Service. Detail of National Forest Administration.

22. Conservation with Special Reference to the Forest Resources of the United States. *One hour credit.* Assistant Professor WATSON.

(See Course 21 in first semester for description of course.)

The treatment of the subject is general and from the standpoint of public economy. Open to all students.

24. General Forestry. *Two hours credit.* Professor YOUNG.

The forester's work and problems he has to solve. Economic importance of forestry. History of forestry in the United States and abroad. Our timber resources and their distribution. Factors affecting tree-growth. Influences of forest upon climate, stream-flow, and erosion. How the forest is reproduced and cared for. Forestry literature.

Non-technical treatment of the subject.

Open to all students. No prerequisites.

24*a*. Identification of Trees and Commercial Woods. *Two hours credit.* Professor YOUNG.

This course may be taken as a separate course or as supplementary to Course 24 by students who desire field and laboratory work in the identification of wood and of our common trees. Open to all students.

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FRENCH

(See Romance Languages and Literatures)

FRESHMAN COURSE

Talks to Freshmen

The required course entitled Talks to Freshmen, which was given during the year 1919-1920, was withdrawn for the year 1920-1921. In its place President Burton gave a series of addresses to Freshmen each semester. No credit towards graduation was given for attendance upon these addresses.

GENERAL LINGUISTICS AND COMPARATIVE PHILOLOGY

(GROUP I)

The courses announced below are designed for students of both ancient and modern languages. They aim to familiarize the students with the general principles and methods of the Science of Language and to present the most important facts in the life and growth of language. Attention is called to the various courses in Psychology.

FIRST SEMESTER

5*f*. Principles of Linguistic Science. *Two hours credit.* Professor MEADER.

This course aims to give a broad general foundation, such as will enable the student or teacher to judge intelligently of the nature of specific phenomena. Among the questions treated will be: the relation of psychology to linguistic science; the nature of language; speech sounds and their changes; changes in the meanings of words; discussion of grammatical categories (noun, verb, mood, etc.); classifications of languages, the genesis of speech. Lectures and recitations.

7. Special Problems in Comparative Philology. *One hour credit.* Professor MEADER.

[9. Practical Phonetics. *Two hours credit.* Professor MEADER.

The object of this course is to familiarize the student with the anatomy and physiology of the speech organs and the manner of production of speech sounds. It is designed both for students who desire to acquire a basis for attaining an accurate pronunciation of foreign languages and for prospective teachers who wish to learn the best methods of teaching difficult foreign sounds. Omitted in 1919-1920.]

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[34. The Psychology of Language. *Two hours credit.* Lectures and discussions. Professors PILLSBURY and MEADER.

Among the subjects treated are: the laws of thought and language; the history of linguistic theory; language as a form of expression; the genesis of speech; and the psychology of syntax.

Professor SCOTT will give four lectures on the genesis of speech. Omitted in 1920-1921.]

SECOND SEMESTER

2. Etymology and Semantics. Primarily for graduates. *Credit to be arranged.* Professor MEADER.

A general introduction to comparative Indo-European philology. Study of the chief characteristics of the Indo-European languages, their relationships and classifications, accent and vowel graduation, comparative syntax.

42. General Course in Experimental Phonetics. Lectures and laboratory work. *One, two* or *three hours credit.* Professors MEADER and SHEPARD.

This course, which is designed for students of psychology, language, oratory, and music, will deal with the anatomy and physiclogy of the human voice, the production of speech sounds, description and classification of sounds, mechanical methods of recording speech sounds, study of speech records. As the number of students admitted to this course will be limited, those desiring to elect it are advised to apply early to one of the instructors in charge.

SUMMER SESSION OF 1921

5*hs*. Principles of the Science of Language and Comparative Philology. *Two hours credit.* Professor MEADER.

GEOLOGY AND GEOGRAPHY

(GROUP II)

The courses in Geology and Geography are planned to meet the requirements of (a) those desiring a general knowledge of Geology as part of a liberal education (Courses 25*a* and 25*b*, and, if practicable, 1*a* and 1*b*); (b) those planning to specialize in political economics, political science, or history (Courses 25*a*, 25*b*, 31, 32, and 33); (c) students of engineering whose profession makes some knowledge of geology essential (Course 1*a* and, if possible, Courses 15, 16*a*, and 16*b*); (d) teachers of earth science in secondary schools (Courses 25*a* and 25*b*, 1*a*, 1*b*, 3, and 12; while 6, 13, 15, 31, and 33 are recommended); (e) students of forestry (Courses 1*a* and 15E, and, if possible, 26); and (f) professional geologists.

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Inasmuch as the different departments of geological study call for widely different prerequisite courses, the student intending to make a career in geology is urged to consult with the department on taking up his work at the University. An outline of courses which are strongly recommended will be laid before him, and, if followed, will greatly facilitate his advancement in the work.

Courses 25*a* and 25*b* are the only courses open to freshmen. A student who is planning extended work will find it most advantageous to take these courses in the freshman year and 1*a* and 1*b* in the sophomore year, so that at the beginning of the junior year studies can be continued under the advice of the department along one or several of the following lines: dynamical and structural geology, stratigraphical geology and paleontology, physiography, geography, glacial geology, or economic geology.

Research is especially encouraged along each of the lines above enumerated, and students are encouraged to go on to graduate work as candidates for the higher degrees. One or more advanced students may generally make arrangements for summer field work in connection with collecting trips in paleontology.

Geology students who intend to become professional geologists and who look forward to teaching positions or to places in State or Federal Geological Surveys are urged early in their course to elect physics, chemistry, mineralogy, and, if possible, Courses 12 and 13 in Surveying. Inasmuch as the surveying courses are given in the College of Engineering, the permission of the Dean of the College of Literature, Science, and the Arts is necessary in order to elect them. Students who intend to specialize in paleontology are required to have some knowledge of elementary biology.

In general, Courses 1*a* and 1*b*, or their equivalent, are considered prerequisites to more advanced courses in geology; and special permission of the instructor must be obtained for admission to advanced courses where the prerequisites have not been fully met. Students primarily interested in the biological phases of geology may enter Course 1*b* on satisfying the instructor of their ability to carry the work.

GEOGRAPHY.—For students specializing in geography, Courses 25*a* and 25*b* are fundamental. The courses in geography are grouped on pages 259 to 263. In addition to the strictly geographic courses, students in geography should elect from the geology group Courses 3, 12, and 15. Additional courses in geology strongly recommended are 1*a*, 1*b*, 16*a*, 16*b*, 15F, 21, and 22. The student of geography should elect in Forestry Courses 21 and 1 or 24. A thorough grounding in the principles of economics and sociology is essential, and Economics 31 and 33 are suggested in addition.

SUMMER FIELD COURSES.—The department offers a summer field course in geology and another in geography, both in the southern Appalachian region of Kentucky and Tennessee, and adjacent areas. The courses are given during the first six weeks of the regular sum-

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mer session. These courses provide a type of systematic training that is not duplicated by the work of the regular school year. All students planning to become geologists or geographers are expected to take this work. A descriptive circular may be secured from the Director, Professor C. O. SAUER.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24, Professor HOBBS will be in Room G 223, N. S., 10 to 12 daily, to advise students desiring to elect courses in Geology.

FIRST SEMESTER

Geology

25*a*. Physiography. *Four hours credit.* Lectures, recitations, and field trips. Professor SCOTT, Mr. DAVIS, and Assistants.

An introductory course in the study and application of land forms, and a general treatment of weather and climate.

This course is open to first year students, and together with 25*b* is intended to lay the foundation for later work in geography and to furnish a broader outlook in courses in history, political science, and political economy.

Juniors and seniors may elect this course as Course 25*d*, and will receive *three hours credit.*

1*a*. Physical Geology. *Three hours credit.* Lectures and recitations. Professor HOBBS, and Mr. GOULD.

A course in dynamical and structural geology intended to prepare the student for the equally important subject of historical geology (1*b*), as well as to supply the need for cultural treatment of the subject. A special object of the course is to train the student in the geological interpretation of scenery. Required of students in civil engineering, and elective for others, but not open to freshmen except by special permission. Geology 1*c*, while required of engineering students only, is strongly recommended in connection with this course.

1*c*. Geological Laboratory. To be elected in connection with 1*a*. (See above.) *One hour credit.* Mr. HUSSEY, and Assistants.

3. Physiography. *Three hours credit.* Professor SCOTT, and Assistant.

An advanced course in which the various land forms, their manner of formation, and the underlying principles will be discussed. The course will consist of lectures, laboratory and field work, and reports on readings of the more important physiographic monographs. It is strongly advised that Course 25*a* or 1*a* be taken as a prerequisite.

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4a. Systematic Invertebrate Paleontology. *Three hours credit.* Mr. EHLERS.

A course extending through the year, describing the origin and development of invertebrate animals. The principles of evolution and distribution as illustrated by the invertebrates are carefully worked out; the fossils are also treated as an aid in the study of stratigraphic geology. Work in invertebrate paleontology can be continued by special arrangement. Given in 1920-1921 and alternate years.

[5. The Origin, Structure, and Growth of Mountains. *Four hours credit.* Professor HOBBS.

A course for advanced students, and treating the conditions which give rise to mountains, the seismic phenomena connected with their growth, the mechanics of folding and the types of flexures in mountain ranges. Given in 1921-1922 and alternate years.]

7. Characteristics of Existing Glaciers. *Four hours credit.* Professor HOBBS.

A course of lectures and reading assignments upon the existing glaciers, with special emphasis upon their morphology, the conditions of their nourishment and waste, and their reactions with the lithosphere. Special attention is given to the continental glaciers of high latitudes and their relations to the former ice-sheets which are treated in Courses 20 and 21. Given in 1920-1921.

8. Current Literature of Geology. Taken for credit by advanced students only, but open to others as visitors. *One hour credit.* Professors HOBBS, CASE, SCOTT, COOK, and SAUER, and Mr. LEVERETT, Mr. EHLERS, Mr. MCMURRAY, and Mr. DAVIS.

Graduates and other advanced students of the department meet one hour each week for reports and discussions of the recent literature of geology.

9a. Systematic Vertebrate Paleontology. *Three hours credit.* With laboratory work and reading. Professor CASE.

A course extending through the year, describing the origin and development of vertebrate animals. The principles of evolution and distribution as illustrated by the vertebrates are carefully worked out; the fossils are also treated as an aid in the study of stratigraphic geology.

11a. Interpretation of Geologic Maps. *Three hours credit.* Given in 1920-1921 and alternate years. This course to be followed by *11b.* Professor COOK.

A course designed to give the student practice in the interpretation of geologic maps together with a detailed knowledge of the structural geology of typical regions in the United States.

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13. Organic Evolution. *Three hours credit.* Professor CASE.
A lecture course describing the origin of man and the domestic animals. Especial attention is paid in this course to the early history of mankind and the stages of culture through which he has passed in attaining civilization.

16*a*. Economic Geology (non-metals). *Three hours credit.* Professor COOK.
A general course treating of the nature, occurrence, and distribution of the non-metallic mineral resources, such as coal, oil and gas, salt, gypsum, building stones, phosphate rock, etc.

[17. Metamorphism. *Three hours credit.* Given in 1920-1921 and alternate years. Professor COOK.
A study of geology from the physico-chemical standpoint. This course is essential to an understanding of the origin and character of ore deposits.
Prerequisites are Geology 1*a* and Mineralogy 2, or their equivalents, and a course in physical chemistry is strongly recommended.]

26. Soil Geology. Laboratory work. *One to three hours credit.* Professor COOK.
This course must be preceded or accompanied by Course 15F.

27. Oil Geology. *Three hours credit.* Professor COOK.
A course treating of the origin, occurrence, and exploitation of deposits of oil and gas. This course should be preceded by Courses 1*a* and 1*b*, and should be followed by Courses 6 and 28.

Geography

31. Geography of Commercial Products. *Three hours credit.* Lectures and recitations. Professor SAUER, and Mr. MCMURRY.
Geographic elements in the production of the principal commodities of world commerce. The great staples of world trade are studied with reference to the principal places of production. Foodstuffs, textile materials, forest products, and the minerals of industry are the principal groups considered. Special attention is given to the factors localizing great manufacturing districts.

32. Geographic Influences in American History. *Three hours credit.* Professor SAUER.
The place of geographic factors in the history of our country, and a comparison of their values with non-geographic factors. Explorations by the Spanish, French, and English in the New World are considered in terms of geographic incentives. The major theme is the process of settlement of the country through

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the discovery and appropriation of localities of superior geographic attraction. For students of history and others.

Prerequisite: Geology 25*b*. It is desirable that History 13 or 14 precede it.

37. Geography of South America. *Three hours credit.* Mr. McMURRY.

A study of agricultural, mining, and manufacturing development, and the distribution of population under the widely differing conditions of environment in the South American countries. Future uses of the great undeveloped agricultural, mineral, and forest resources, and the possibilities of trade with the United States in these products, as well as the development of South American markets for American manufactured goods, are considered. The development of transportation facilities, as affecting industries, location, and relative importance of seaports, ocean trade routes, and the importance of the Panama Canal are taken up. Argentina, Chila, and Brazil are specially considered, with emphasis on commercial relations with the United States.

Prerequisites: Economics 1 or Geology 31.

39. Geography of Michigan. *Two hours credit.* Professor SAUER.

This course is intended to familiarize the student with the regional economic conditions and problems of the state. The bases of the recent industrial transformation of southern Michigan, the economic situation and outlook for Michigan farming, the impending extinction of the lumber industry and the decadence of the lumber centers, and the significance of mining are considered. Especial emphasis is placed on the problem of idleness of half of the land area of the state. Transportation facilities and problems of both peninsulas are studied. The principal cities are examined as sites for commerce and industry.

Prerequisites: Two courses in Geography.

SECOND SEMESTER

Geology

1*a*. Physical Geology. *Three hours credit.* Lectures and quiz. Professor HOBBS, and Mr. GOULD.

A course in dynamical and structural geology intended to prepare the student for the equally important subjects of historical geology (1*b*), as well as to supply the need for cultural treatment of the subject. A special object of the course is to train the student in the geological interpretation of scenery. Required of students in civil engineering, and elective for others, but not open to freshmen except by special permission.

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Geology 1*c*, while not required, is strongly recommended in connection with this course.

1*c*. Geological Laboratory. May be elected in connection with 1*a* and 1*b*. (See above.)

1*b*. Historical Geology. *Three hours credit.* A few excursions may be taken. Professor CASE, and Assistant.

An introductory course in historical and stratigraphical geology designed to follow Geology 1*a* so as to give the student a complete view of the elements of the subject. This course gives an outline history of the development of the North American continent and its relation to other continents; the distribution of the various rocks upon the surface, with something of their relation to economic products and geographical features; the origin and development of plants and animals in geological time.

4*b*. Systematic Invertebrate Paleontology. *Three hours credit.* With laboratory work. Mr. EHLERS.

This course is a continuation of Course 4*a* given in the first semester.

6. Field Geology. *Three hours credit.* Professor SCOTT.

In this course the methods of geological field work will be discussed and practice given in the use of the more important instruments necessary for the prosecution of such work. The major portion of the work will be in the field in the vicinity of Ann Arbor.

9*b*. Systematic Vertebrate Paleontology. *Three hours credit.* With laboratory work and reading. Professor CASE.

This course is a continuation of Course 9*a*, given in the first semester.

[10. History of Geology. *Three hours credit.* Given in 1921-1922 and alternate years. Professor HOBBS.

An advanced course treating of the development of the science of Geology and of the lives and teachings of its founders.]

11*b*. Stratigraphical Geology of North America. *Three hours credit.* Given in 1920-1921 and alternate years. Professor CASE.

An account of the development of the continent as recorded in the deposits, the faunal changes, and the diastrophic movements. The subject will be treated in a broad way, all matter bearing on the history of the continent being so far as practicable introduced and the student directed to the sources of information.

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12. Elementary Meteorology. *Two hours credit.* Professor SCOTT.
This course is designed to follow Course 3 in physiography, and is an elementary treatment of the dynamics of the atmosphere. In it will be discussed the properties and movements of the atmosphere, weather and its variations, together with some account of weather predictions.

35. Evolution of the Earth's Facial Expression. *Four hours credit.* Professor HOBBS.
An advanced course treating of the problems of evolution of continents and mountains, as well as those connected with volcanic action, and especially the origin of lava, the cause of its rise to the surface, and the mechanism of eruption. Incidentally, the nature of the earth's interior and the theories of origin of the earth will be gone into. It is believed that this course will prove of value to students of astronomy and petrography.

15F. Soil Geology. *Three hours credit.* Professor COOK, and Assistant.
A comprehensive survey of the subject, including the origin of soils, their physical and chemical constitution, the influence of climate on soil fertility, irrigation and drainage, tillage, fertilizers, etc., and a consideration of the regolith of the United States in relation to geologic, physiographic, and climatic factors.
Geology 1*a* and Mineralogy 1 and 9 are prerequisites.
The attention of students desiring additional laboratory work is directed to Course 26.

16*b*. Economic Geology (metals). *Three hours credit.* Professor COOK.
In this course the metallic mineral resources are treated in the same manner as are the non-metallic resources during the first semester. Although this course may be elected independently of Geology 16*a*, both are essential to a general survey of the subject.

19. Ore Deposits. *Three hours credit.* Given in 1920-1921 and alternate years. Professor COOK.
A detailed study of the character, origin, and exploitation of the iron, lead, zinc, copper, silver, and gold ores.
This course should be preceded by Geology 1*b* and 17. Geology 16*b* is also recommended.

20. Pleistocene Glaciation of North America and Europe. *One hour credit.* Mr. LEVERETT.
A course of twelve lectures dealing with pleistocene glacial history. (See Course 21.)

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21. Glacial Field Studies. *One hour credit.* Mr. LEVERETT.
Weekly field excursions to study the glacial formations accessible from Ann Arbor. Supplementary to Course 20.

22. Research and Special Work. Professors HOBBS, CASE, SCOTT, COOK, and SAUER, and Mr. LEVERETT.

26. Soil Geology. Laboratory work. *One to three hours credit.* Professor COOK.
This course must be preceded or accompanied by Course 15F.

28. The Stratigraphy of Oil Geology. *Three hours credit.* Mr. EHLERS.
A course describing the distribution and stratigraphic relations of the various oil horizons. This course should follow Course 27.

Geography

25*b*. Principles of Geography. *Four hours credit.* Lectures and recitations. Required excursions will be given after Easter. Professor SAUER, Mr. MCMURRY, Mr. DAVIS, and Assistants.
Influence of environment on the conditions of life, with special reference to man. Location, area, types of climate, land forms and soil, relations between land and sea, and mineral resources are considered in their effects upon social and economic conditions and upon the distribution of races and population. Type illustrations are selected from many regions and afford drill in geographic location.
Prerequisite: Course 25*a* or its equivalent.
Juniors and seniors may elect this course at 25*c* and will receive *three hours credit.*

25*e*. Geography for Teachers. *Three hours credit.* With the class in Course 25*b*. Additional work: (1) Preparation of reports on the condition and needs of earth science teaching; (2) discussion of teaching problems one evening a week. Professor SAUER, and Mr. DAVIS.
Especial emphasis will be placed on the relation of geography to general science in the high school. The time of the special weekly meeting is to be arranged.

31. Geography of Commercial Products. *Three hours credit.* Mr. MCMURRY.

33. Geography of North America. *Three hours credit.* Professor SAUER.
First course in regional geography. A systematic study of the United States, Canada, Alaska, Mexico, and the West Indies,

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with special reference to industrial and commercial conditions and opportunities and to the distribution of population.
Prerequisite: Geology 31 or 25*b*.

34. Field Course in Regional Geography. *Credit to be arranged,* and will depend upon the amount of field work and the nature of the paper. Professor SAUER.
The work will consist of (a) an individual and intensive field study of geographic conditions in a selected region, and (b) of a systematic paper on the geography of the region. Detailed mapping and census taking will be required to illustrate type conditions.
Prerequisites: Geology 3, 15, and 33.

38. Routes and Centers of World Trade. *Three hours credit.* Professor SAUER, and Mr. MCMURRY.
The course is intended to follow and supplement Course 31. It deals with (a) the general character of sea-borne traffic, (b) the location, significance and nature of traffic of the great ocean routes, (c) the land routes, rail, river, and lake, which contribute in a major way to world commerce, (d) seaports that serve as gateways to continents, (e) fuel stations, with reference to supplies of coal and oil, and (f) interior centers of commerce. The commercial rivalry of the leading nations is considered in the terms of position, resources, and stage of development.
Course 31 is a prerequisite.

SUMMER SESSION OF 1921

21. Teachers' Course in Physiography. *Two hours credit.* Professor SCOTT, and Assistant.

12. Elementary Meteorology. *Two hours credit.* Professor SCOTT, and Assistant.

23. Geographic Influences. *Two hours credit.* Mr. MCMURRY.

31*a*. Commercial Geography. *Two hours credit.* Mr. MCMURRY, and Assistant.

For Graduates

22. Research and Special Work. *Credit to be arranged.* Professor SCOTT, and Mr. MCMURRY.

Field Courses in Kentucky and Tennessee

35. Field Course in Geology. *Eight hours credit.* Mr. EHLERS, and Mr. HUSSEY.

36. Field Course in Geography. *Eight hours credit.* Professor SAUER.

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GERMANIC LANGUAGES AND LITERATURES

(GROUP I)

German

Students especially interested in language study are advised to elect two foreign languages in the freshman year. Two new languages, however, should not be begun at the same time. See page 155.

Courses 1, 2, 3, and 4, or their equivalent, must precede all other courses in German. The work in these courses is laid out on the basis of an entire academic year, and it is expected that the student will not change instructor or section at the end of the first semester without consulting the head of the department. Students intending to begin the study of German in the University are strongly advised to do so in their first year.

The prerequisites for Courses 5-10 are specifically designated under the courses described.

All courses beyond 10 are advanced undergraduates and graduate courses, and should be elected only after consultation with the instructors.

Students who have had one year of German in the high school and wish to pursue the study in the University should elect Course 2.

Students who have had two years of German in the high school should elect Course 3 or 3*e*.

Students who have had three or four years in the high school should elect Course 5.

Students intending to prepare themselves to teach German are strongly advised to elect Courses 5 and 6 and Courses 9, 10, 13, 14, 17, and 18. All such students are urged to consult Professor WINKLER (Room 203, U. H.) as soon as possible for the more careful adjustment of their work in German.

Attention is called to the special reading courses in German in the departments of Botany, Course 36; Chemistry 20; Physics 37; and Zoölogy 29.

Throughout registration week, September 20 to 24, Professor WINKLER will be in Room 203, U. H., to advise students in regard to elections in German.

FIRST SEMESTER

Introductory Courses.

1. Elementary Course. Pronunciation, grammar, easy readings, with practice in speaking and writing German. *Four hours credit.* Four sections. Professors WINKLER, DIEKHOFF, and HILDNER, and Dr. WAHR.

   No credit toward graduation is counted for this course until Course 2 is satisfactorily completed.

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3. Modern Prose, narrative and dramatic, with practice in speaking and writing German. Reviews in German grammar. *Four hours credit.* Four sections. Professors DIEKHOFF, and HILDNER, and Dr. WAHR.

3*c*. Scientific German. *Four hours credit.* Professor WINKLER.
This course is designed especially for students who intend to enter the Medical School.
Prerequisite: Two years of German in high school or one year of German (Courses 1 and 2) in the University.

4. Selected Dramas from Lessing, Goethe, or Schiller. Reviews in German grammar and practice in reading and writing German. *Four hours credit.* Dr. WAHR.

Third-year Electives.

5. Schiller's *Wallenstein,* with Collateral Readings and Exercises in German Grammar and Composition. *Four hours credit.* Professor DIEKHOFF.
Prerequisites: Courses 3 and 4, or their equivalent.

9. German Composition. *Two hours credit.* Professor DIEKHOFF.
Prerequisites: Courses 3 and 4, or their equivalent.

9*b*. German Conversation. *Two hours credit.* Two sections. Professor HILDNER.

9*c*. German Prose. Readings from representative modern German writers. Advanced course. *Two hours credit.* Professor WINKLER.

Advanced Courses.

11. Teachers' Course. Practical work, and discussions on grammar, composition, and the reading material now used in the high schools. Intended primarily for seniors. *Two hours credit.* Professor HILDNER.

13. German Grammar. Lectures on Phonology, Word Formation, and Inflection. Advanced course intended for undergraduates and graduates, particularly for prospective teachers of German. Professor DIEKHOFF.

15. Goethe's *Faust.* Part I. Lectures and recitations. Thomas' edition. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor WINKLER.

17. History of German Literature. From the earliest times to the end of the Middle Ages. Lectures, selected readings, and reports. Thomas' Anthology of German Literature. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor WINKLER.

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19. The Beginnings of the Romantic Movement in Germany in its relation to German Classicism and to the social, political, and philosophical thought of the times. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor WINKLER.

19*a*. History of German Literature from 1848-1870. Lectures, discussions, and reports. Advanced course open to undergraduates and graduates. Professor HILDNER.

[27. Introduction to Middle High German. Lectures and recitations. Paul's *Mittelhochdeutsche Grammatik.* Advanced course open to undergraduates and graduates. *Two hours credit.* Professor DIEKHOFF. Omitted in 1920-1921.]

[29. Old High German. Lectures and recitations based upon Braune's *Abriss der Althochdeutschen Grammatik* and reading of selections from Braune's *Althochdeutsches Lesebuch. Two hours credit.* Primarily for graduates. Professor DIEKHOFF. Omitted in 1920-1921.]

[39. Seminary in the German Classics. A comprehensive study of the lives and works of Goethe, Schiller, or Herder, with investigations of selected topics. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor WINKLER. Omitted in 1920-1921.]

[43. The Storm and Stress Movement. A comprehensive study of the movement, with investigations of selected topics. Advanced course open to undergraduates and graduates. *Credit to be arranged.* Professor HILDNER. Omitted in 1920-1921.]

SECOND SEMESTER

1. Elementary Course. Pronunciation, grammar, easy readings, with practice in speaking and writing German. *Four hours credit.* Professor DIEKHOFF.

2. Elementary Course. Continuation of Course 1. Grammar, descriptive prose, short stories, with practice in speaking and writing German. *Four hours credit.* Four sections. Professors WINKLER, DIEKHOFF, and HILDNER, and Dr. WAHR.

4. Selected Dramas from Lessing, Goethe, or Schiller. Reviews in German grammar and practice in reading and writing German. Continuation of Course 3. *Four hours credit.* Four sections. Professors DIEKHOFF, and HILDNER, and Dr. WAHR.

4*c*. Scientific German. Continuation of Course 3*e*. *Four hours credit.* Professor WINKLER.

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Third-year Electives.

5. Schiller's *Wallenstein*, with Collateral Readings and Exercises in German Grammar and Composition. *Four hours credit.* Dr. WAHR.

6. Goethe's *Iphigenie* and Lessing's *Nathan der Weise*, with Collateral Readings and Exercises in German Grammar and Composition. Continuation of Course 5. *Four hours credit.* Professor DIEKHOFF.

10. German Composition. Continuation of Course 9. *Two hours credit.* Professor DIEKHOFF.

10*b*. German Conversation. Continuation of Course 9*b*. *Two hours credit.* Two sections. Professor HILDNER.

10*c*. German Prose. Readings from representative modern German writers. Continuation of Course 9*c*. *Two hours credit.* Professor WINKLER.

Advanced Courses.

12. Teachers' Course. Continuation of Course 11. Practical work, and discussions on grammar, composition, and reading material now used in the high schools. Intended primarily for seniors. *Two hours credit.* Professor HILDNER.

14. German Syntax. Continuation of Course 13. *Two hours credit.* Professor DIEKHOFF.

16. Goethe's *Faust*. Part II. Continuation of Course 15. Thomas' edition. *Two hours credit.* Professor WINKLER.

18. History of German Literature. From Luther to Lessing. Continuation of Course 17. Lectures, selected readings, and reports. Thomas' Anthology of German Literature. *Two hours credit.* Professor WINKLER.

20. History of the Younger Romantic Movement and *Das junge Deutschland*. Continuation of Course 19. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor WINKLER.

20*a*. History of German Literature from 1848 to 1870. Continuation of Course 19*a*. Lectures, reports, and discussions. Advanced course open to undergraduates and graduates. *Two hours credit.* Professor HILDNER.

[28. Middle High German. Selected readings from the most important works of this period. Continuation of Course 27. *Two hours credit.* Professor DIEKHOFF. Omitted in 1920-1921.]

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[30. Old High German. Readings from Otfrid's *Evangelienbuch*, and lectures on Old High German Literature. Primarily for graduates. Continuation of Course 28. *Two hours credit.* Professor DIEKHOFF. Omitted in 1920-1921.]

[40. Seminary in the German Classics. A comprehensive study of the lives and works of Goethe, Schiller, or Herder, with investigations of selected topics. Continuation of Course 39. *Two hours credit.* Professor WINKLER. Omitted in 1920-1921.]

[44. Proseminary in the Storm and Stress Movement. Continuation of Course 43. *Two hours credit; hours to be arranged.* Professor HILDNER. Omitted in 1920-1921.]

[46. The Faust Legend and Kindred Themes in European Literature. *Two hours credit; hours to be arranged.* Primarily for graduates. Professor WINKLER. Omitted in 1920-1921.]

SUMMER SESSION OF 1921

JOURNAL CLUB

Current Literature on German Philology and Literature. Meetings of instructors and advanced students in the German department are held every three weks throughout the academic year, at which reports are made in important recent contributions on German Philology and Literature.

1*as*. Beginners' Course. *Four hours credit.* Professors WINKLER and DIEKHOFF.

2*a*. Reading of Easy German Stories with Practice in Speaking and Writing German. *Two hours credit.* Professor HILDNER.

3*a*. Modern Prose. *Two hours credit.* Professor HILDNER.

3*e*. Scientific German. *Two hours credit.* Professor WINKLER.

5. Goethe's *Iphigenie and Tasso*, or Lessing's *Nathan der Weise*. *Two hours credit.* Professor DIEKHOFF.

9. German Composition. *Two hours credit.* Professor DIEKHOFF.

9*a*. German Prose. *Two hours credit.* Professor WINKLER.

9*c*. German Conversation. *Two hours credit.* Professor HILDNER.

For Graduates and Undergraduates.

13. Advanced German Grammar. *Two hours credit.* Professor DIEKHOFF.

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15. Goethe's *Faust*. *Two hours credit.* Professor WINKLER.

18*a*. Studies in Modern German Literature. *Two hours credit.* Professor HILDNER.

27. Introduction to Middle High German. *Two hours credit.* Professor DIEKHOFF.

39*a*. Pro-Seminary in Goethe, Schiller, Herder, or Lessing. *Two hours credit.* Professor WINKLER.

Gothic

FIRST SEMESTER

[1. Lectures on Phonology and Morphology and reading of the Gospels, Wright's *Primer of the Gothic Language*. Primarily for graduates. *Two hours credit.* Professor DIEKHOFF. Omitted in 1920-1921.]

SECOND SEMESTER

[2. Epistles. Heyne's *Ulfilas*. *Two hours credit.* Professor DIEKHOFF. Omitted in 1920-1921.]

SUMMER SESSION OF 1921

1. Lectures on Phonology and Morphology and Reading of the Gospels. *Two hours credit.* Professor DIEKHOFF.

Old Norse

[Old Icelandic. Introductory course. Lectures and reading of selections from the sagas. Kahle's *Altisländisches Elementarbuch*. Primarily for graduates. Omitted in 1920-1921.]

Scandinavian

FIRST SEMESTER

[1. Scandinavian Literature in English. Lectures, readings, and reports based on English translations of Holberg, Hertz, Lie, Kielland, Björsen, Strindberg, and Selma Laferlöf. The relation of these writers to the larger European literary movements will be especially considered. Omitted in 1920-1921.]

SECOND SEMESTER

[2. Henrik Ibsen. A comprehensive study of his works, his thought, and his influence upon the contemporary drama. Lectures, readings, and reports. Omitted in 1920-1921.]

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GREEK LANGUAGE AND LITERATURE

(GROUP I)

Students especially interested in language study are advised to elect two foreign languages in the freshman year. Two new languages, however, should not be begun at the same time. A suggested program in classical language study is outlined on page 154.

Students intending to enter upon the study of Greek at any time in their course will find it to their advantage to do so in their first year.

The courses marked A and B are designed for those who have had no opportunity to take Greek before admission, or have not been able to complete the entrance requirements in Greek. Course C is intended for students who have had only one year's work in Greek before entering the University. A credit of four hours will be given for each one of these courses satisfactorily completed.

Courses 1 and 2 must precede all the other numbered courses except those grouped below under the heading, "Greek Courses in English."

In addition to Courses 1, 2, 3, and 5, students who are preparing to teach Greek are recommended to elect at least twelve hours more under the advice of the instructors in the department.

During the period from September 20 to 24, the instructors in the department will be found in Room 108, T. H., and prospective students are urged to consult them. Conferences will be held at hours which will be posted upon the bulletin board beside the door of Room 108, T. H.

Greek

FIRST SEMESTER

A. Elementary Greek. *Four hours credit.* Assistant Professor ROBBINS.

No credit towards graduation is counted for this course until Course B is satisfactorily completed.

This course, with its continuation, Course B in the second semester, will enable students to take up Course 1 the following year.

C. Xenophon's *Anabasis,* or other selections from easy Attic prose. Homer, *Iliad* or *Odyssey,* one book. Review of Grammar. *Four hours credit.* Professor BONNER.

This course is intended for students who have had only one year of Greek before entering the University.

1. Homer, *Odyssey,* selections. *Four hours credit.* Professor BONNER.

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3. Selections from the lyric and elegiac poets, and from the history of Herodotus. *Three hours credit.* Professor WINTER.

7. Seminary in Aeschylus. All of the plays will be read, and portions will be selected for critical study and interpretation. Introductory lectures, and topics and reports relating to the early history of tragedy. *Two hours credit.* Professor BONNER.

[*7c.* Seminary. The Tragedies of Sophocles. Professor WINTER. Omitted in 1920-1921.]

[*7e.* Seminary in Greek Religion. Studies in literary texts and inscriptions illustrating the history and development of Greek Religion. Professor BONNER. Omitted in 1920-1921.]

[*12a.* Demosthenes. The Philippic and Olynthiac Orations, with collateral studies in the history of the times and the development of Attic oratory. *Three hours credit.* Assistant Professor ROBBINS. Omitted in 1920-1921.]

12b. Thucydides. The Sicilian Expedition. *Three hours credit.* Assistant Professor ROBBINS.

15. The Bucolic Poets. Theocritus, Bion, and Moschus, with studies in the history of pastoral poetry. *Three hours credit.* Professor BONNER.

21. Pindar. The Olympian and Pythian Odes, and selections from Bacchylides. Professor BONNER.
To be omitted in 1920-1921, unless requested as a substitute for Course 15, above, or Course 17 in the second semester.

31. Reviews in Greek Literature, Grammar, and Antiquities. For candidates for the higher degrees. *One hour credit; hour to be arranged.* Professors BONNER and WINTER, and Assistant Professor ROBBINS.

SECOND SEMESTER

B. Elementary Greek. Continuation of Course A. Xenophon's *Anabasis* and Greek prose writing. *Four hours credit.* Assistant Professor ROBBINS.

2. Plato, *Apology;* Euripides, *Medea.* *Four hours credit.* Professor BONNER.

5. Greek Drama. Sophocles, *Antigone;* Aristophanes, *Birds* or *Frogs.* *Three hours credit.* Professor WINTER.

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6*b*. Greek Prose Composition. *Two hours credit.* Assistant Professor ROBBINS.

8. Seminary in Aeschylus. Continuation of Course 7. Professor BONNER.
These hours may be changed to meet the needs of students.

[8*c*. Seminary. The Tragedies of Sophocles. Continuation of Course 7*c*. Professor WINTER. Omitted in 1920-1921.]

[8*e*. Seminary in Greek Religion. Continuation of Course 7*e*. Professor BONNER. Omitted in 1920-1921.]

[11*a*. Plato's *Phaedo*. Introductory lectures, rapid reading, and interpretation. Studies in the philosophy of Plato. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

11*b*. Plato's *Republic*. Introductory lectures, rapid reading, and interpretation. Studies in the philosophy of Plato. *Three hours credit.* Professor WINTER.

17. Aristophanes, Selected Plays, with studies in the life and times of the poet. *Three hours credit.* Professor BONNER.

[20. Aristotle's *Poetics*, and Studies in Ancient Literary Criticism. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

SUMMER SESSION OF 1921

A*s*. Elementary Greek. *Two or four hours credit.* Assistant Professor ROBBINS.

2*s*. Rapid Reading of Greek Prose. *Two hours credit.* Assistant Professor ROBBINS.

For Graduates.

7*ds*. Seminary in the Greek Tragedy. Professor BONNER.

Greek Courses in English

The courses grouped under this head do not require a knowledge of the Greek language. They are intended for students who have not had time or opportunity to learn Greek, but wish to acquire some knowledge of Greek literature and life, and of the debt which modern civilization owes to the Greeks.

FIRST SEMESTER

16. Greek Literature in English. Lectures, assigned readings, and reports. *Three hours credit.* Professor WINTER.
No knowledge of the Greek language is required for this course.

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The aim is to give students an acquaintance with the masterpieces of Greek literature from Homer to Theocritus through the medium of English translations.

29. Ancient Greek Life. Assistant Professor ROBBINS. Elect as Classical Archæology 4.

SECOND SEMESTER

10. The Greek Drama in English Translations. Lectures on the history, development, and influence of Greek drama; assigned readings and reports. *Three hours credit.* Professor BONNER. No knowledge of the Greek language is required for this course.

14. Greek Mythology. Professor BONNER. Elect as Classical Archæology 6.

30. Topography and Monuments of Ancient Athens. Illustrated lectures and assigned readings. Professor WINTER. Elect as Classical Archæology 8.

32. Christian Literature and Institutions in the Apostolic Age. *Two hours credit.* Assistant Professor ROBBINS. Elect as Hellenistic Greek 6.

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10*s*. The Greek Drama Studied in Translations. *Two hours credit.* Professor BONNER.

29*s*. Ancient Greek Life. *Two hours credit.* Assistant Professor ROBBINS.

Hellenistic Greek

Students who wish to enter these courses are expected to have had Courses A and B in Classical Greek. See the description above.

FIRST SEMESTER

1. Elementary Course. The Gospels according to Mark, Matthew, and Luke, with grammatical study of Hellenistic Greek. Students should provide themselves with one of the standard texts, such as Westcott and Hort, Nestlé, or Souter (Oxford text). *Three hours credit.* Assistant Professor ROBBINS.

3. The Pauline Epistles. *I* and *II Corinthians, Romans.* Reading and interpretation. *Two hours credit.* Assistant Professor ROBBINS.

5. History of the New Testament. Professor SANDERS.
This course deals with the origin and dates of the various books of the New Testament, and then traces the history of the text through versions and manuscripts down to the age of printing.

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SECOND SEMESTER

2. The Acts of the Apostles and the Fourth Gospel. *Three hours credit.* Assistant Professor ROBBINS.
This course may be taken, if desired, as two separate parts, viz.:
2*a*. The Acts of the Apostles. *Two hours credit.*
2*b*. The Fourth Gospel. *One hour credit.*

4. The Pauline Epistles. *Galations I* and *II, Thessalonians, Ephesions. Two hours credit.* Assistant Professor ROBBINS.
In place of one or two of the Epistles, the class may interpret selections from the works of the Apostolic Fathers, if such reading be preferred.

6. Christian Literature and Institutions in the Apostolic Age. *Two hours credit.* Assistant Professor ROBBINS.
This course deals with the history and contents of the books of the New Testament, the circumstances under which they were written, early Christian literature outside of the New Testament, the history of the Apostolic Age, and those phases of contemporary paganism which affect Christian history. Lectures, assigned readings, and class discussions.
A knowledge of Greek is not required of students electing the course.

SUMMER SESSION OF 1921

2*s*. The New Testament in Greek. *Two hours credit.* Assistant Professor ROBBINS.

History of Religions

FIRST SEMESTER

19. Elementary Phenomena of Religion. *Two hours credit.* Professor BONNER.
A study of primitive forms of religion, such as fetichism, animism, ancestor-worship, magic, etc. The subject will be illustrated not only from the religion of the Greeks and other ancient peoples, but also from the religious practices of modern peoples living under primitive conditions of civilization. Lectures, assigned readings, and reports.
For other courses in the history of Religions, see under Semitics.

JOURNAL CLUB

Analysis and criticism of important articles in the domain of Greek and Latin languages and literatures, Greek and Latin grammar and lexicology, Greek and Roman history, archæology, and antiquities, by members of the classical faculty, and of the Greek and Latin seminaries. Fortnightly, throughout the year.

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Hebrew
(See Semitics)

Hellenistic Greek
(See Greek Language and Literature)

HISTORY

(GROUP III)

Students entering upon historical work are, as a rule, required to take first either Courses 1 and 2, dealing with the history of Europe since the seventeenth century, or Courses 1*a* and 2*a*, dealing with the history of England, or Courses 1*b* and 2*b*, dealing with the history of Greece and Rome. The order advised is 1 before 2, or 1*a* before 2*a*, or 1*b* before 2*b*; but those who find it necessary to begin their work in history the second semester may take 2 before 1, or 2*a* before 1*a*, or 2*b* before 1*b*. Students who intend to take advanced work in history should elect these introductory courses (either 1 and 2, or 1*a* and 2*a*, or 1*b* and 2*b*) as early as possible after entering college, preferably in the first year.

Juniors and seniors may elect these introductory courses only by special permission, and for three hours credit instead of four.

As soon as the introductory work is completed, students may elect courses in one or more of the following fields: American history (13, 14, 15, 37); ancient history (7, 8); English history (3, 4, 5, 6); history of the Middle Ages and age of the Renaissance and Reformation (9, 10); modern European history (11, 12); Latin-American history (51, 52, 53, 54). These courses lead on to more advanced work in each field, and students are advised to consult with those in charge of such work concerning choice of courses.

REGISTRATION OF STUDENTS PREPARING TO TEACH HISTORY IN THE SCHOOLS.—Students who expect to teach history and kindred subjects in the schools, and who desire recommendation from members of the department of history, should register with the department as early as possible in their course, preferably by the beginning of their junior year. They may thus have special guidance in planning their work for the end in view.

Such students will be regarded as in one or another of three groups—C, B, A,—according to the degree of preparation sought.

In Group C will be those who specialize in some other subject, and pursue history only as a minor. These students, to receive any statement from members of the department of history, must do, aside from introductory work in college, at least six hours in each of two main fields outside of that in which the introductory work was done. (By "main fields" is meant such divisions as Ancient, Medieval, Modern, English, American.)

In Group B will be those who specialize in history, but cannot go further (at least temporarily) than the bachelor's degree. For

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such students the minimum requirement, aside from the introductory work, will be at least six hours in each of three main fields outside of that in which the introductory work was done, and at least one of Courses 21 and 22. (Courses 21 and 22 are of pro-seminary character.)

In Group A will be those who would go far enough with their studies to prepare for positions in the better high schools and the junior colleges—who would plan then to go at least as far as the master's degree. For such students the minimum requirement in history will be, aside from the introductory work: (1) in courses other than pro-seminary or seminary, thirty-six hours, distributed so as to include six hours in each main field outside of that in which the introductory work was done; (2) in pro-seminary and seminary, at least one of Courses 21 or 22, and four hours of seminary.

In addition to the requirements in history, students will be expected to do some work in certain other subjects—especially political science, economics or sociology, and foreign language and literature; and according to circumstances, geography, psychology, and philosophy.

The advice given to registering students, in regard alike to work in history and to work in other fields, will be determined largely by individual needs. The registration will be in charge of Professor Dow.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24: Professors TURNER and FRAYER, daily, 10 to 12, Rooms 202, 207, T. H.

FIRST SEMESTER

Primarily for Undergraduates.

1. The General History of Europe, from the seventeenth century to 1815. *Four hours credit.* Lectures and quizzes. Professor FRAYER, Mr. LUCAS, Mr. CARROLL, Mr. RYSKAMP, and reading assistants.

This course and Course 2 deal with Europe since the Thirty Years' War. The rise of Prussia and of Russia, the decline of Spain, the ascendancy of France, the great Revolution and the Napoleonic empire are the chief subjects for study during the first semester; the growth of nationalities and changing industrial, social, and political conditions, and the recent history of Europe in the nineteenth century.

Courses 1 and 2 are not open to those who have taken or are taking Courses 1*a* and 2*a*. Juniors or seniors may elect this course only by special permission, as Course

101, and will receive but *three hours credit.*

1*a*. The General History of England to the Accession of James I. *Four hours credit.* Lectures and quizzes. Professor TURNER, Dr. STEPHENSON, and reading assistants.

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This course and Course 2*a* are designed to give some idea of the character and culture of the people of England, and of the development of institutions which were afterwards brought to America. Narrative and military history will not be neglected, but emphasis will be put upon social and economic matters and the development of the constitution and of English law.

Courses 1*a* and 2*a* are not open to students who have taken or are taking Courses 1 and 2. Juniors or seniors may elect this course only by special permission, as Course

101*a*, and will receive but *three hours credit.*

1*b*. The History of Greece and the Near East to 201 B. C. *Four hours credit.* Professor BOAK.

This course begins with a brief survey of the rise of civilization in Egypt, Mesopotamia, and the other countries of the near east; discusses the pre-Hellenic civilization of the Ægean basin, and traces the history of the Greeks to the beginning of the Roman conquest of the Hellenic world.

This is an introductory course, designed (like Courses 1 and 1*a*) primarily for freshmen. Juniors or seniors may elect this course only by special permission, as Course

101*b*, and will receive but *three hours credit.*

[5. The History of England from the Beginnings of the American Revolution to the Reform Bill of 1832. *Three hours credit.* Discussions on lectures and assigned reading. Professor CROSS. Omitted in 1920-1921.]

6. The History of England from the Reform Bill of 1832 to the Close of the Great War. *Three hours credit.* Discussions on lectures and assigned readings. Professor CROSS.

9. Europe in the Middle Ages, from Rome to Feudalism. Lectures, reading, and discussions. *Three hours credit.* Professor DOW.

This course treats the history of our western world during one of the chief stages of its evolution—that when Rome gave way before invaders from Germany and Arabia, and the peoples of modern Europe took on their broader lines; when thought and life came to be moulded increasingly by the Christian church, and the papacy advanced to a large role in both church and secular affairs; and when feudalism in some form became the most widely controlling factor in political and social arrangements.

[11. The Rise of Prussia as a Factor in European History in the Seventeenth, Eighteenth, and Nineteenth Centuries. Lectures, reading, and quizzes. *Three hours credit.* Professor FRAYER.

Although the history of Prussia will be strongly emphasized, the

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general development of modern Germany will be treated; and a comparative study will be made of the influence exerted by the Enlightened Despotism of the eighteenth century.

Open only to juniors and seniors. Omitted in 1920-1921.]

11*a*. The Revolutionary and Napoleonic Period in Europe (1789-1815. Lectures, assigned reading, special reports, and discussions. *Three hours credit.* Professor FRAYER.

This course will deal somewhat generally with the political, social, and economic conditions in Europe under the Old Regime, and much more intensively with the period of the French Revolution and Napoleon. The permanent influences of this period, and especially the relation of the French Revolution to modern world conditions, will be considered. A reading knowledge of French is recommended. Open only to juniors and seniors.

14. The Political and Constitutional History of the United States. Lectures and quizzes. *Three hours credit.* Lectures and quizzes. Professor VAN TYNE.

This course, supplemented by Course 15 in the second semester, covers the history of the United States from the outbreak of the Revolution to the Civil War. Special attention is given in this semester to the divergent English and American political theories, the methods of organizing the Revolutionary War, the European diplomatic entanglements, the relations of the Continental Congress and the states, the efforts to solve the problem of imperial organization, the Constitutional Convention, and the Federalist organization of the new government.

This course should be taken in the sophomore year by those who propose to make a special study of American History.

16. The History of the United States in the Civil War and Reconstruction. *Three hours credit.* Lectures, reading, and quizzes. Professor PHILLIPS.

This course treats of the causes and process of secession; the problems and conduct of the war, and the theories and readjustments in industry, society, and government which followed the collapse of the Southern Confederacy.

For Upperclassmen and Graduates.

3. The Constitutional and Legal History of England, to Magna Charta. *Three hours credit.* Lectures, discussion on lectures and assigned reading. Professor CROSS.

The aim of this course is to explain the formation of the English constitution and to trace the origin and development of English institutions, political and legal. It should be of particular interest to those who intend to study law. It is open to juniors and seniors who have had an introductory course, and, by special permission, to those who have not.

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[*7a.* The Constitutional Development of the Greek States to the End of the Fifth Century. Lectures, reports, and discussions. *Three hours credit.* Professor BOAK.

This course traces the development of political institutions and systems of government in the Greek states from their origins until the fall of the Athenian Empire, with special consideration of the Athenian democracy. Omitted in 1921-1921.]

7b. Greek Political Theories of the Fourth Century and the States of the Hellenistic Age. Lectures, reports, and discussions. *Three hours credit.* Professor BOAK.

This course treats of the theories of state of Plato and Aristotle, of the rise of federal states, of absolute monarchy, of bureaucracy, and of the other political developments of the Hellenistic Age.

[*19b.* Social Europe in Medieval Times. Lectures, reading, and discussions. *Two or three hours credit.* Professor DOW.

This course treats briefly of social reconstruction from Roman to feudal times, and then more especially of noble, cleric, peasant, artisan, and trader in the midst of feudalism, and of the chief social changes arising with the progress of commerce and industry, the development of towns, and the building of regional and national states. Concerning the part of townspeople in these changes, attention will be given particularly to France and the Low Countries. Omitted in 1920-1921.]

20a. The Renaissance. Lectures, reading, and discussions. *Two or three hours credit.* Professor DOW.

This course treats of society, thought, and life in and beyond Italy from the twelfth to the seventeenth century. Attention is given chiefly to the conditions or currents that made for intellectual changes, and to the most outstanding persons representing those changes.

21. Studies in Medieval and Early Modern Times, conducted as a pro-seminary. *Two or three hours credit.* Professor DOW.

This course gives opportunity for special study of some subject relating to the Middle Ages, Renaissance, or Reformation; each member of the class selecting a subject according to his preference and equipment. But the main object of the course is to provide guidance for the beginner in more advanced or independent study. The matters emphasized concern chiefly preparation of a bibliography and critical use of documents and works.

38. The History of the South, Colonial and Ante-Bellum. Lectures, reading, and quizzes. *Three hours credit.* Professor PHILLIPS.

An economic, social, and political study. The plantation system,

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with its dependence upon staple crops, unfree labor, free trade, and local autonomy, is taken as a key to the development and policy of the South. The first semester's work, extending to 1820, deals chiefly with the development of the régime within the South.

[51. The History of Latin American. Lectures and quizzes. *Three hours credit.*

This course will deal with the European background of Spanish and Portuguese America, the conquest, the native civilizations, and the institutions and life of the colonial period. A reading knowledge of Spanish will be of considerable value. Omitted in 1920-1921.]

[53. The History of the Pacific Area. Lectures and quizzes. *Three hours credit.*

The history of the activities of European peoples and of the United States in the Pacific Ocean and the adjacent regions; and the development of the native races of the Far East, such as the Chinese and Japanese; with a consideration of the present situation and problems within that area. Omitted in 1920-1921.]

[55. The Spaniards in North America. Lectures and quizzes. *Three hours credit.*

This course deals particularly with the history of the Spanish occupation of Mexico and with Spanish settlements in the present territory of the United States; also with the development of republican Mexico. Omitted in 1920-1921.]

[57. The History of Spain. Lectures and reports. *One hour credit.*

This course deals with the development of the institutions of the Iberian peoples, both before their transplanting in America and parallel with their growth in the colonies. Among the subjects treated are: the Roman and Saracen influences, the rise of Castile and Aragón, the establishment of a strong monarchy by the Catholic Kings and the early Hapsburgh, the Decadencia, the Bourbon revival Portugal under the House of Aviz, the Church, the cities and the cortes, and the relation of art and literature to the national life. The course is especially designed for prespective teachers of Spanish and for those who intend to take Course 51 and 52. Omitted in 1920-1921.]

Primarily for Graduates.

59. Seminary in American Revolutionary History. *Two hours credit.* Professor VAN TYNE.

This course is intended to offer training in the investigation of historical problems, and practice in the handling of original

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material. The work in 1920-1921 is concerned with a series of historical problems in preliminaries of the American Revolution, chosen for the purpose of illustrating various methods of research. Open only to graduates and to seniors obtaining special permission.

23. Seminary in English History. *Two hours credit.* Professor CROSS.
This course is devoted to the investigation of topics mainly in the sixteenth and seventeenth centuries. The work of 1920-1921 will be concerned with the Puritan Revolution. Open only to graduates, and to seniors with the permission of the instructor.

25. Seminary in Medieval and Early Modern European History. *Two hours credit, or more by special permission.* Professor DOW.
The members of the class coöperate with the instructor in the study of a subject from the courses, and may work individually on other subjects. Open only to graduates.

41. Seminary in American History. *Two hours credit.* Professor PHILLIPS.
Intensive research by students upon assigned topics, and discussion of reports presented. Open only to graduates and to seniors obtaining permission of the instructor. The principal field for study will be American negro slavery as a working régime and as an issue in public discussion.

47. Seminary in Modern European History. *Two hours credit.* Professor TURNER.
In 1920-1921 this seminary will have to do with certain selected problems in English and in European history.
Open only to graduates, and to seniors obtaining special permission.

SECOND SEMESTER

Primarily for Undergraduates.

2. The General History of Europe since 1815. *Four hours credit.* Professor FRAYER, Mr. LUCAS, Mr. CARROLL, Mr. RYSKAMP, and reading assistants.
This course forms a continuation of Course 1. The class will be organized in the same way as in the first semester, with lectures and quiz sections, as announced under Course 1. Juniors or seniors may elect this course only by special permission, as Course

102, and will receive but *three hours credit.*

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2*a*. The General History of England, from the Accession of James I to 1920. *Four hours credit.* Professor TURNER, Dr. STEPHENSON, and reading assistants.

This course forms a continuation of Course 1*a*. The class will be organized in the same way as in the first semester, with lectures and quiz sections, as announced under Course 1*a*. Juniors or seniors may elect this course only by special permission, as Course

102*a*, and will receive but *three hours credit.*

2*b*. The History of Rome, to 565 A. D. *Four hours credit.* Professor BOAK.

This course forms a continuation of Course 1*b*. The class will be organized in the same way as in the first semester, with lectures, quiz sections, hours, and rooms as announced under Course 1*b*. Juniors or seniors may elect this course only by special permission, as Course

102*b*, and will receive but *three hours credit.*

32. The Origin and Development of the British Empire. Lectures, reading, and discussions. *Three hours credit.* Professor CROSS.

This course will include a study of such present problems as the Egyptian and Indian questions and Imperial Federation.

10. Europe from Feudal to National Times. Lectures, reading, and discussions. *Three hours credit.* Professor DOW.

This course treats of institutions, problems, and efforts in the western world when the feudal régime and the church were at their height; and then of various changes in the time of the Renaissance and Reformation. It is designed primarily for the sophomore or junior year, and, when possible, should be preceded by Course 9 or equivalent general preparation in the earlier Middle Ages.

12. Europe Since 1870. Lectures, assigned reading, special reports, and discussions. *Three hours credit.* Professor FRAYER.

Starting with the completion of Italian and German unity, the course will treat of the recent diplomatic history of Europe, the formation of the Triple Alliance and the Triple Entente, the growth of intense national rivalries, Germany as a colonial and naval power, the Moroccan and Balkan questions, and the outstanding causes of the Great War.

[13. The History of Colonial America. Lectures, with assigned readings and quizzes. *Three hours credit.*

The expansion of Europe into the New World, with emphasis upon study of the English colonies. The course will deal with

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European origins, political and economic development, colonial society and culture, the frontier, imperial rivalries, and intercolonial relations, and especially with relations between colonial and imperial governments. Omitted in 1920-1921.]

15. The Political and Constitutional History of the United States. Lectures and quizzes. *Three hours credit.* Professor VAN TYNE.

Course 15 is a continuation of Course 14, and deals with the reform movements of the Jeffersonian democracy, the development of national feeling, the westward movement and the rise of the political power of the West, the Jacksonian type of democracy, slavery and abolition, party entanglement in the slavery issue, and the final clash of the northern and southern social systems upon the frontier border beyond the Mississippi.

17. The United States in Recent Decades. Lectures, readings, and quizzes. *Three hours credit.* Professor PHILLIPS.

In sequence to Course 16, this course treats of the political, economic, and social history of the United States from about the year 1876 to near the present time.

For Upperclassmen and Graduates.

4. The Constitutional and Legal History of England since Magna Charta. Lectures, reading, and discussions. *Three hours credit.* Professor CROSS.

This course is a continuation of Course 3.

8*a*. The Roman Republic. Lectures, reports, and discussions. *Three hours credit.* Professor BOAK.

This course is a study of the constitutional development of the Roman state from its beginning until the end of the period of the Republic.

[8*b*. The Roman Empire. Lectures, reports, and discussions. *Three hours credit.* Professor BOAK.

This course is a study of the Roman government system from the foundation of the Principate by Augustus to the time of Justinian. Omitted in 1920-1921.]

20*b*. The Reformation. Lectures, reading, and discussions. *Two or three hours credit.* Professor DOW.

This course treats of the history of Europe from the fourteenth to the sixteenth century, with special reference to problems and measures concerning the church and religion.

22. Studies in Modern Historiography. *Two hours credit.* Professor DOW.

This course includes a general survey of the writing of history

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in modern times, and a study (with report) by each member of the class of the life and work of some outstanding historical writer.

39. The History of the South, Colonial and Ante-Bellum. Lectures, reading, and quizzes. *Three hours credit.* Professor PHILLIPS.
An economic, social, and political study. The plantation system, with its dependence upon staple crops, unfree labor, free trade, and local autonomy, is taken as a key to the development and policy of the South. The second semester's work relates chiefly to the issues of state rights and slavery in federal politics.

[52. The History of Latin America. Lectures and quizzes. *Three hours credit.*
Course 52 is a continuation of Course 51, and deals with the republican period of Latin America. Stress will be laid upon present-day conditions, political, social, and economic, and upon the relations of the republics with the United States. Omitted in 1920-1921.]

[54. The History of the Pacific Area. Lectures and quizzes. *Three hours credit.*
This course is a continuation of Course 53, and deals especially with developments in the Far East since 1800. Omitted in 1920-1921.]

[58. The History of Spain. Lectures and reports. *One hour credit.*
This course is a continuation of Course 57. Omitted in 1920-1921.]

Primarily for Graduates.

60. Seminary in American Revolutionary History. *Two hours credit.* Professor VAN TYNE.
Course 60 is a continuation of Course 59. Open only to graduates and to seniors obtaining permission.

24. Seminary in English History. *Two hours credit.* Professor CROSS.
This course is a continuation of Course 23. It is open only to graduate students and to seniors obtaining permission.

26. Seminary in Mediæval and Early Modern European History. *Two hours credit, or more by permission.* Professor DOW.
This is a continuation of Course 25, and is open only to graduates.

42. Seminary in American History. *Two hours credit.* Professor PHILLIPS.
Course 42 is a continuation of Course 41.

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48. Seminary in Modern European History. *Two hours credit.* Professor TURNER.
Course 48 is a continuation of Course 47.

SUMMER SESSION OF 1921

2. Europe Since 1815. *Four hours credit.* Professor FRAYER.

16*s*. Greek Civilization to 200 B. C. *Two hours credit.* Professor BOAK.

26*s*. The History of Rome to 565 A. D. *Two hours credit.* Professor BOAK.

32*a*. The History of the British Empire. *Two hours credit.* Professor CROSS.

12*s*. The Great War and Reconstruction. *Two hours credit.* Professor PHILLIPS.

39*s*. The History of the Ante-Bellum South. *Two hours credit.* Professor PHILLIPS.

50*a*. The Teaching of History. *Two hours credit.* Professor DOW.

14*s*. The Political and Constitutional History of the United States (1765 to 1800.) *Two hours credit.* Professor VAN TYNE.

18*s*. Seminary in American Revolutionary History. *Two hours credit.* Professor VAN TYNE.

History of Religions
(See Semitics)

Hygiene
(See Medical Sciences)

Insurance
(See Mathematics)

INDO-EUROPEAN LANGUAGES AND LITERATURE

(GROUP I)

Sanskrit

The study of Sanskrit is of value to students of the Indo-European (1) languages, (2) literatures, (3) philosophy and religion, (4) social institutions, and (5) for those preparing to do missionary work in India. The courses offered below are designed especially for students of the languages, ancient and modern, and are adjusted to the needs of those preparing to teach. They are correlated with

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the courses in Comparative Philology, but individual aid and direction will be given to any who wish to devote themselves to other aspects of the study.

Before beginning the study of Sanskrit, the student should have pursued courses in one of the three subjects, Greek, Latin, and German, or in lieu of German some one of the other Teutonic languages or a Slavonic language, for at least four semesters.

FIRST SEMESTER

1. Beginners' Course. Grammar, and exercises in translation and composition. Text-books: Whitney's *Grammar,* or Thumb's *Handbuch des Sanskrit,* and Lannan's *Sanskrit Reader. Two hours credit.* Professor MEADER.

[3. Advanced Reading: Kalidasa's *Cakuntala.* Elements of Prakrit. *One hour credit.* Professor MEADER. Omitted in 1920-1921.]

[3*a*. Rapid Reading of Easy Sanskrit. *One or two hours credit.* Professor MEADER. Omitted in 1920-1921.]

SECOND SEMESTER

2. Interpretation of selections contained in Lanman's *Sanskrit Reader,* with elementary studies in the comparative morphology of the more important cognate languages. *Two hours credit.* Professor MEADER.

[4. Advanced Reading. Selections from the *Vedas. One hour credit.* Professor MEADER. Omitted in 1920-1921.]

Old Bulgarian

FIRST SEMESTER

[1. Beginners' Course. *Two hours credit.* Professor MEADER. This course is designed for students interested in Slavonics or in Indo-European comparative philology. Omitted in 1920-1921.]

Russian

In consequence of the increasing importance of Russia in intellectual, political, and commercial activities, a practical acquaintance with the Russian language is rapidly becoming a necessity for English-speaking peoples. The courses offered below are especially designed for students interested in Russian literature, historical sources, and commercial affairs, and Indo-European comparative philology, and for those who are preparing to enter the diplomatic service.

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FIRST SEMESTER

1. Beginners' Course. Elements of the language. Selected readings from Tolstoi and other writers will serve as the basis of the work. *Three hours credit.* Professor MEADER.

3. Advanced Russian. Reading, composition, and conversation. *Three hours credit.* Professor MEADER.

7. Russian Literature in English. Lectures and assigned readings. *Two hours credit.* Professor MEADER.
No knowledge of the Russian language is required. Courses 8 and 9 are continuous in character and should be elected consecutively, as each is essential to the understanding of the other. They are designed for those who desire to pursue the study of the literature under the guidance of an instructor, without devoting time previously to the acquisition of the language. The courses deal mainly with the Age of Catharine, with Pushkin, Gogol, Dostoevski, Turgenev, Tolstoi, Nekrasov, Chekhov, Gorki, Andrev, Guprin, and Artsybashev.

SECOND SEMESTER

2. Continuation of Course 1. Readings from Pushkin, Lermontov, Turgenev, and Tolstoi. *Three hours credit.* Professor MEADER.

4. Continuation of Course 3. *Three hours credit.* Professor MEADER.

8. Continuation of Course 7. *Two hours credit.* Professor MEADER.

10. Interrelations of Russian and Western European Literature. *Two hours credit.* Professor MEADER.
Course 10 must be preceded by Courses 7 and 8, or an equivalent. It provides an opportunity for more detailed study of some of the problems treated in Courses 8 and 9.

SUMMER SESSION OF 1921

1*s*. Elementary Russian. *Two hours credit.* Professor MEADER.

7*s*. Russian Literature in English. *Two hours credit.* Professor MEADER.

Italian

(See Romance Languages and Literatures)

Journalism

(See Rhetoric)

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LANDSCAPE DESIGN

Courses 1, 2, and 5 may be elected by any student above the rank of freshman, without previous preparation. Courses 3 and 4 may also be elected by students not specializing in outlined programs in Landscape Design.

Courses 7 to 12 are designing courses; each period implies *three hours work;* and when outside work is necessary, such as stadia surveying, ground measurement, and inspection, the entire morning or entire afternoon will be required, at the discretion of the instructor.

Those interested in landscape design are referred to the special announcement of the Curriculum in Landscape Design, which may be obtained by application to the Secretary's office.

Students wishing to consult about these courses may do so by appointment with Professor TEALDI and Assistant Professor WHITTEMORE during registration week, September 20 to 24, and later at the hours posted in the South Wing, South Corridor. Telephone University Exchange 152-J, between 1 and 2 o'clock; City Exchange 2430.

FIRST SEMESTER

1. Introduction to the Study of Landscape Design. Lectures, collateral reading, and reports. *Three hours credit.* Professor TEALDI, and Assistant Professor WHITTEMORE, with occasional lectures by Mr. SIMONDS.

   Course 1 is designed to give a general knowledge of the variety of problems to be met with in the practice of landscape gardening. It is not intended as a technical course, such as a course in construction or design. The general problems are treated separately and special stress is laid upon the subject of good taste and common sense in all problems, from the simple arrangement of the city yard to the laying out of a country estate. During the first weeks of the semester one lecture may be omitted and a two-hour or three-hour period may be devoted to the actual study of local examples. The lectures are illustrated by the use of the stereopticon.

3. Study of Materials for Planting Design: Trees and Shrubs. Lectures, reports, and field work. *Three hours credit.* Assistant Professor WHITTEMORE, with occasional lectures by Professor TEALDI.

   Course 3 is intended to make the student familiar with the shrubs and trees generally used in landscape gardening. It is not intended as a course in botany; courses in botany are prerequisites of this course. The æsthetic value of plants are to be studied; their shape, size, habits, favorite habitat, their autumn coloring both of leaves and fruit, their general aspects in autumn and winter. One field trip a week is taken, and a

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report of the trip is required. During the second part of the semester the field trip is omitted; the period is devoted to laboratory work, when the entire afternoon may be required. The lectures are illustrated by the use of the stereopticon.

5. Art of Garden Design and Landscape Gardening in England. Lectures, with collateral reading and reports. *Three hours credit.* Professor TEALDI.

The object of this course is to follow the gradual development of gardening in England from the earliest efforts to present day, laying special stress upon the transition of styles and the development of the Naturalistic or English style. The lectures are illustrated by the use of the stereopticon.

7. Design of Home Grounds. Study of local examples of private grounds. Solution of original problems. Drafting, conferences, and collateral reading. *Four hours credit.* Assistant Professor WHITTEMORE.

The work in Course 7 consists chiefly of the application to actual problems of the knowledge acquired in Courses 3, 4, and 6. The students are required to work out problems presented to them in definite form by the instructors, with the same attention to details which is necessary in actual office practice. The drafting consists of plans, profiles, colored sketches and finished drawings.

9. City Planning I: Parks and Park Systems. *Four hours credit.* Professor TEALDI.

11. City Planning III: Design of Cemeteries. *Four hours credit.* Professor TEALDI.

[13. Planting Design I. *Three hours credit.* Professor TEALDI.

In Courses 13 and 14 the general knowledge of plants acquired in Courses 3 and 4 will be applied to the actual use of plants in Landscape Composition. Lectures, quizzes, drafting problems, and field work. In the problems the details of planting composition will be presented in plan, elevation, and perspective.

Prerequisites: Landscape Design 1, 3, and 4. Given in alternate years. Omitted in 1920-1921.]

SECOND SEMESTER

2. City Planning and Civic Improvement. *Three hours credit.* Professor TEALDI, and Assistant Professor WHITTEMORE.

There is a growing tendency throughout the state to take up in earnest the different phases of civic improvement. As this subject grows to be recognized in the state of Michigan as it

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has been in other states, as a matter of vital importance not only to municipalities but to every individual, whether in the country or in the city, there will arise a demand for men and women to lead the way of civic progress in their communities. These leaders will be recruited from teachers and other citizens who have devoted time to a study of this most complex question. Course 2 is offered with the express purpose of stimulating civic spirit and a desire for further investigation among those who would like to keep abreast of the movement for civic improvement and who are interested in its sane development. Among the subjects treated are the following: city out-lay, streets, bridges, squares, public buildings, parks, trees, and other natural assets, city nuisances, problems of wires and advertisements as they affect the appearance of the city; dirt, smoke, and noise as they affect life in the city. Special stress is laid upon the housing problem, particularly as it is affected by the Garden City movement.

This course may be considered a practical introduction to City Planning.

4. Study of Material for Planting Design: Trees, Shrubs, and Perennials. Lectures, planting plans, reports, and field work. *Three hours credit.* Assistant Professor WHITTEMORE.

Course 4 is a continuation of Course 3. The trees and shrubs are studied chiefly in relation to their flowering and leafing characteristics and their ornamental values in spring and summer. Hardy herbaceous perennials are studied also along the same lines. The lectures are illustrated by the use of the stereopticon.

6. Practice in Design. Study of local examples, sketch plans, reports. Solution of simple original problems based on topographical surveys. Field work, drafting, and conferences. *Four hours credit.* Assistant Professor WHITTEMORE.

Course 6 is open only to those students who have passed satisfactorily in Courses 3 and 4 or who can satisfy the instructor that they have done equivalent work.

8. Design of Large Country Places. *Four hours credit.* Professor TEALDI, and Assistant Professor WHITTEMORE.

Whereas Course 7 deals with home grounds proper, whether in the city or in the country, and therefore with moderate sized and small areas which offer the restricted problems common in cities and shrubs, Course 8 deals with larger problems in which the broad lay-out is the main feature. Actual surveys are used in this and the following courses as the basis of all problems.

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10. City Planning II. Continuation of Course 9. *Four hours credit.*

12. City Planning IV. The City Plan. *Six hours credit.*

[14 Planting Design II. Continuation of Course 13. *Three hours credit.* Professor TEALDI.
Given in alternate years. Omitted in 1920-1921.]

16. Advanced Flower Garden Design. *Two hours credit.* Professor TEALDI.
This course follows Course 7 and should be taken at the same time as Course 8.
Prerequisites: Courses 1, 3, 4, 5, 6, and 7.

SUMMER SESSION OF 1921

1*s*. Introduction to the Study of Landscape Design. *Two hours credit.* Professor TEALDI.

3*s*. Trees, Shrubs, and Flowers. *Two hours credit.* Professor TEALDI.

2*s*. Civic Improvement. *Two hours credit.* Professor TEALDI.

15. Planting Design III. *Two hours credit.* Professor TEALDI.

LATIN LANGUAGE AND LITERATURE

(GROUP I)

Students especially interested in language study are advised to elect two foreign languages in the freshman year. Two new languages, however, should not be begun at the same time. Suggestions with reference to the grouping of language courses are given on page 154.

Courses A and B are designed for students entering with two units in Latin, and should be elected in the first year. A credit of four hours is given for each course.

Students entering with four units in Latin should elect Courses 1 and 2 in the first year, and 3 and 4 in the second year. Course 6*a* is also open to second year students.

Third year students may elect from Courses 7, 7*a*, 7*b*, 7*c*, 10*a* or 10*b*, 11, 12, 14, 14*a*, and 16*a*.

In order to increase the range of work offered to advanced students, several of the courses in Latin are given in alternate years, new courses being introduced as opportunity is thus afforded.

Students who are preparing to teach Latin are recommended to take Courses 7, 10*a* or 10*b*, 11, 12, 21, 21*a*, 22, and 22*a*. It is advised that they complete at least Courses 1 and 2 in Greek, either having presented two units of Greek for admission and having taken Courses 1 and 2 as regular freshman work, or, if Greek be not presented for

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admission, having completed Courses A and B as well as 1 and 2 in the University.

All students expecting a recommendation to teach should consult the head of the department early in their course. Special courses will be arranged to suit individual needs.

Courses 1, 1*a*, 2, 3, 4, 4*a*, 4*b*, and 6*a* are intended primarily for undergraduates. Courses 5*f*, 6*g*, 7, 7*a*, 7*b*, 7*c*, 7*e*, 8, 10*a*, 10*b*, 11, 12, 13, 13*a*, 14, 14*a*, 15, 16, 16*a*, 18, 21, 21*a*, 22, and 22*a* are for graduates and undergraduates. Courses 18*b*, 24, 25, 26, 27, 28, and 31 are exclusively for graduates.

CONSULTATION HOURS.—During Registration week, September 20 to 24, Professor CRITTENDEN, daily, from 10 to 12. Room 208, U. H.

FIRST SEMESTER

Y. Elementary Preparatory Latin. This course and Course Z, running throughout the year, cover the first two units of the entrance requirements in Latin. Successful completion of the courses entitles the student to two units for admission; but no college credit is given. A fee of $10 is charged for each semester. Dr. BUTLER.

B1. Virgil *Æneid*. Translation and interpretation, metrical reading and studies in Greek and Roman mythology. *Four hours credit.* Assistant Professor MEINECKE.

B2. Selections from the Roman Law. Reading and interpretation of passages from Gaius and Justinian. *Four hours credit.* Professor CRITTENDEN.

This course is open to students who have had two years of high school Latin. It is especially designed for prospective students of law and legal institutions.

1. Cicero, Essays. *De Senectute, De Amicitia;* Selections from Catullus or Ovid. Latin Writing. *Four hours writing.* Professor CRITTENDEN, and Assistant Professor MEINECKE.

1*a*. Roman History and Politics. *Four hours credit.* Professor CRITTENDEN.

Readings from selected Latin authors, designed to be of value to students of law and political science. If desired, this course may also be elected for *three hours credit.*

2. Livy, Book I or XXI. Plautus. Terence. *Four hours credit.* Assistant Professor MEINECKE.

3. Horace. Selections from the *Odes, Satires,* and *Epistles. Four hours credit.* Professor CRITTENDEN, and Assistant Professor MEINECKE.

These sections may also be elected as *three-hour* courses, 3*a*.

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5*f*. General Linguistics. A general introduction to the science of language. *Two hours credit.* Professor MEADER.
This course should be elected as General Linguistics and Comparative Philology 5*f*.

[6*a*. Roman Comedy. Selected plays of Plautus and Terence. *Two hours credit.* Assistant Professor MEINECKE. Omitted in 1920-1921.]

7. Roman Political Institutions. *Two hours credit.* Professor SANDERS.

11. Latin Writing. *Two hours credit.* Professors SANDERS and MEADER.
Course 11 is introductory to Course 12. The principal aim is to secure correctness of expression and a feeling for idiom.
This course is intended for juniors, but sophomores are admitted by special permission.

13. Juvenal. Interpretations and lectures. *Two hours credit.* Professor WINTER.

[13*a*. Lucretius. Interpretations and lectures. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

[14. Tibullus and Propertius. Interpretations, with lectures on the Roman elegy. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

[14*a*. Catullus and Martial. Interpretations and lectures. *Two hours credit.* Professor SANDERS.

15. Introduction to Latin Palæography. *Two hours credit.* Professor SANDERS.
Lectures on the various styles of writing found in Latin manuscripts, with exercises in reading from facsimiles.

21. Teachers' Course. Interpretations of Cæsar's *Gallic War*, with studies in the syntax and military antiquities. *Two hours credit.* Professor SANDERS.
Courses 21, 21*a*, and 21*b* are open only to those who receive special permission. Those who elect Course 21 are required to elect also 21*a*.

21*a*. Teachers' Course. Lectures on the *Gallic War*. *One hour credit.* Professor SANDERS.

[21*b*. Studies in Cæsar. Consultation. Professor KELSEY. No credit is given for this course. Omitted in 1920-1921.]

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25. Reports on the Progress of Research. *No credit.*
Analysis and criticism of important articles in the domain of the Latin and Greek languages and literatures, Latin and Greek grammar and lexicology, Greek and Roman history, archæology, and antiquities, by members of the classical faculty and members of the Latin and Greek Seminaries.

27. Seminary. Propertius, with studies in the Roman Elegy. *Two hours credit.* Professor SANDERS.
Course 27 is open to graduate students only.

SECOND SEMESTER

Z. Elementary Preparatory Latin. Dr. BUTLER.
Courses Y and Z, running throughout the year, cover the first two units of the entrance requirement in Latin. Successful completion of the courses entitles the student to two units for admission; but no college credit is given. A fee of $10 is charged for each semester.

A. Selections from Cicero and Sallust. With comparison of ancient and modern oratory, and collateral work in Roman history and government. *Four hours credit.* Professor CRITTENDEN.

2. Livy, Book I or XXI. Plautus. Terence. *Four hours credit.* Professor CRITTENDEN, and Assistant Professor MEINECKE.

4. History of Roman Literature. *Four hours credit.* Lectures and recitations, with readings. Professor WINTER, and Assistant Professor MEINECKE.

4*a*. General Course in Roman Literature. *Two hours credit.* Professor WINTER, and Assistant Professor MEINECKE.
This course is designed for students interested in the general subject of literature, who do not wish to make an intensive study of Latin. No knowledge of Latin is required. The Roman literature will be treated in its broad relation to the Greek literature and to modern literature.

4*b*. The *Letters* of Pliny the Younger. Interpretation of selected letters, with a study of Roman literary and social conditions at the end of the first century, A. D. *Two hours credit.* Assistant Professor MEINECKE.

6*g*. Comparative Philology. A general introduction to comparative Indo-European philology. *Two hours credit.* Professor MEADER.
This course should be elected as General Linguistics and Comparative Philology 6*g*.

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7*a*. Tacitus, *Agricola, Germania,* and selections. Interpretations and lectures. *Two hours credit.* Professor CRITTENDEN.

7*b*. Proseminary in Roman Political Institutions. Studies in the Imperial Period. *One hour credit.* Professor SANDERS.
Graduate students will take this as a *two-hour course, 7d.*

[7*c*. Tacitus, *Histories.* Interpretations and lectures. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

[7*e*. The Annals of Tacitus. Interpretations and lectures. *Two hours credit.* Professor WINTER. Omitted in 1920-1921.]

8. Roman Law. See Courses in Roman Law and Jurisprudence.

10*a*. The Topography and Monuments of Ancient Rome. Illustrated lectures. *Three hours credit.* Professor WINTER.
Elect as Classical Archæology 2*a*.

[10*b*. Roman Life as Illustrated by Works of Art and Objects of Common Use. *Three hours credit.* Professor KELSEY.
Elect as Classical Archæology 2*b*. Omitted in 1920-1921.]

12. Latin Writing. Advanced Course. *Two hours credit.* Professors MEADER and SANDERS.
In Course 12, attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language. It is limited to those whose work in Course 11 has been of a high grade.

[16. Latin Inscriptions. *Credit to be arranged.* Professor KELSEY.
Reading of inscriptions of different periods from the De Criscio collection and from reproductions. Interpretation of selected inscriptions. Omitted in 1920-1921.]

16*a*. The *Letters* of Cicero. Interpretation of selected letters, with a study of Roman manners and political conditions at the end of the Republic. *Two hours credit.* Professor SANDERS.

18. Lectures on the Latin Language. *Two hours credit.* Professor MEADER.
The object of this course is to give the student a scientific basis for the study and teaching of the Latin language. The subjects treated will be: the history of the Latin sounds and inflections; the forms and meanings of the more important syntactical types; Latin word formation.

[18*b*. The Italic Dialects. *Two hours credit.* Professor MEADER.
Lectures and recitations on the phonology, morphology, and syntax of Oscan and Umbrian. Interpretation of inscriptions. Omitted in 1920-1921.]

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22. Teachers' Course. Virgil. *Two hours credit.* Professor SANDERS.
Students are required to combine 22*a* with 22.

[22*b*. Studies in Virgil. Consultation. Professor KELSEY. No credit given for this course. Omitted in 1920-1921.]

24. Reviews in Roman Literature. *One hour credit.* Professors SANDERS, MEADER, and WINTER.
Students who are candidates for advanced degrees in this department will be given systematic reviews during the second semester.

26. Reports on the Progress of Research. Continuation of Course 25. *One hour credit.*

28. Seminary. Propertius, with studies in the Roman Elegy. Professor SANDERS.
Course 28 is open to graduate students only.

[31. Lectures on the Sources of Roman Historians. Professor SANDERS.
The chief historians, their methods of work, their interrelationships, and final indebtedness to tradition, historical records, or their own memories, will be discussed. Incidentally, the historical foundation of much in Roman history will be touched upon. This course is intended primarily for advanced students in Latin and teachers of ancient history. Omitted in 1920-1921.]

SUMMER SESSION OF 1921

Zs. Cæsar's Gallic War. *For entrance.* Professor ————.

4*s*. Virgil. *Two hours credit.* Professor ————.

7*s*. Latin Writing. *Two hours credit.* Professor CRITTENDEN.

8*s*. Readings from Roman Historians. *Two hours credit.* Professor CRITTENDEN.

21*c*. Teachers' Course in Cicero. *Two hours credit.* Professor CRITTENDEN.

15. Latin Paleography. *Two hours credit.* Professor SANDERS.

6*a*. Roman Comedy. *Two hours credit.* Professor ————.

For Graduates and Undergraduates.

17*s*. The Latin Vulgate of the New Testament. *Two hours credit.* Professor SANDERS.

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27*s*. Tacitus. *Two hours credit.* Professor SANDERS.

31. Direction in thesis work and in reading on historical sources and the institutions of the Roman Empire. *No credit.* Professor SANDERS.

MATHEMATICS

(GROUP II)

Courses 1, 2, 3, and 4 (or equivalent courses), taken in order, furnish the preparation preliminary to further study in any field of pure or applied mathematics. Courses 1E, 2E, 3E, and 4E are equivalent to the courses prescribed for students in the College of Engineering (see announcement of that College).

Courses A, C, 1, 1E, 2, 2E, 3, 3E, 3*a*, 3*b*, 4, 4E, 4*a*, 4*b*, 47, 48, 51, and 52 are intended primarily for undergraduates; Courses 5, 6, 7, 8, 9, 11, 12, 13, 14, 19, 20, 23, 24, 25, 26, 27, 28, 29, 30, 33, 34, 49, 50, 53, 54, 55, 56, 57, and 58, are for undergraduates and graduates; other courses are primarily for graduates, though undergraduates of exceptional ability are admitted by special permission.

Students preparing to teach mathematics in high schools should take Courses 1, 2 (or 1E, 2E), 3, 4, 19, and 20, and five or more hours of additional work, to be selected after conference with the head of the department. Such conference should be had not later than the beginning of the second year.

Students intending to specialize in Actuarial or Statistical Mathematics are advised to consult the instructor in charge early in their course, and to examine carefully the program of studies under the course in Insurance and Statistics in the special bulletin of courses in Business Administration. Professor GLOVER will be in Room 405, Mason Hall, from 10 to 12, September 20 to 24, inclusive, to consult with students who desire to take up this work. The courses in mathematics for students in actuarial or statistical lines of study should be taken in the following order: 1, 2, 3, (or 3E), and 51, 4 (or 4E), and 52, 13, 49 and 53, 14, 50 and 54, 55, 56.

A representative of the department of mathematics will be in Room 108, M. H., from 10 to 12, September 20 to 24, inclusive, to advise students with reference to matters connected with mathematical work.

FIRST YEAR ELECTIONS

Students intending to take first-year mathematics should elect either Course A, C, 1, 1E, or 2, according to the following:

1. Course A is intended for those who have studied neither solid geometry nor trigonometry. A knowledge of these subjects is essential for those wishing to take up engineering mathematics.

2. Course C is for those who present for entrance to the University one unit (only) of algebra, and one unit (only) of geometry.

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3. Course 1 is for those presenting for entrance one and one-half units (only) of algebra, and one or one and one-half units of geometry.

4. Course 1E is for those presenting for entrance one and one-half units of algebra, one and one-half units of geometry, and one-half unit of trigonometry.

5. Course 2 is for those presenting for entrance one and one-half units of geometry, two units of algebra, and one-half unit of trigonometry.

Other students should consult a representative of the mathematics department in regard to their elections.

FIRST SEMESTER

A. Geometry and Plane Trigonometry. *Four hours credit.* Mr. JOHNSON.

C. Algebra and Geometry. *Four hours credit.* Mr. PETERSON, Mr. ANNING, Mr. FIELD, and Mr. HALBERT.

1. Algebra, Trigonometry, and Analytic Geometry. *Four hours credit.* Professors MARKLEY, KARPINSKI, and BRADSHAW, Assistant Professor COE, Mr. JOHNSON, Mr. PETERSON, Mr. BARNARD, Mr. ANNING, Mr. FIELD, and Mr. HALBERT.

1E. Algebra and Analytic Geometry. *Four hours credit.* Professor FORD, Mr. JOHNSON, Mr. FIELD, and Mr. HALBERT.

2. Plane Analytic Geometry. *Four hours credit.* Assistant Professor COE, Mr. PETERSON, and Mr. ANNING.

2E. Analytic Geometry. *Four hours credit.* Professor FORD.

3. Calculus, I. *Four hours credit.* Professor BEMAN.
Courses 3 and 4 give considerable attention to the historical and pedagogical aspects of the subject, and are required for Courses 19 and 20.

3E. Calculus, I. *Five hours credit.* Professor MARKLEY.

3*a*. Calculus, Shorter Course, I. *Three hours credit.* Professor BRADSHAW.
Courses 3*a* and 4*a* are intended for those who, while not wishing to specialize in mathematics, desire as a part of a liberal education an acquaintance with the leading ideas of the Infinitesimal Calculus and its important applications.

4*b*. Calculus, II. *Four hours credit.* Assistant Professor COE.

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5. Solid Analytic Geometry. *Two hours credit.* Professor BEMAN.

Course 5 presupposes a knowledge of the calculus. The text-book used in Bell's *Coördinate Geometry of Three Dimensions.*

7. Descriptive Geometry. *Three hours credit.* Professor BRADSHAW.

A broad survey will be given of the various methods of representing three-dimensional objects by plane figures, with primary emphasis on the geometrical theory.

9. Differential Equations. *Three hours credit.* Professor BEMAN.

Course 9 deals with the solution of ordinary and partial differential equations and is based on Johnson's *Differential Equations.*

11. Theory of Functions of a Complex Variable, I. *Three hours credit.* Professor MARKLEY.

See note under Course 15.

The fundamental ideas of complex numbers, their geometric interpretation and their calculus, with introduction to the theories of functions as developed by Cauchy, Riemann, and Weierstrass.

13. Higher Algebra, I. *Three hours credit.* Professor KARPINSKI.

This course is intended to supplement the work usually done in a short, first course in college algebra. It consists of a consideration of those algebraic topics and processes commonly used in all branches of mathematics, both pure and applied. It should be taken by those whose interests require constant use of mathematics, either in scientific work or in teaching.

Course 3 should precede or accompany this course.

15. Theory of Functions of a Real Variable, I. *Three hours credit.* Professor MARKLEY.

NOTE:—It is intended to give Courses (11, 12) and (15, 16) in alternate years. If, however, the necessity and demand appear, a year's work in Courses 11 and 15 will be given.

The purpose of Courses 15 and 16 is to investigate and obtain a precise formulation of the necessary and sufficient conditions for the validity of the processes of analysis, particularly the "limiting" processes. They are concerned with such notions as the nature of numbers, point-sets, functional relations, classification of functions with reference to continuity, differentiability, integrability, etc., with illustrative applications.

17. Theory of the Potential. *Three hours credit.* Professor ZIWET.

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19. Teachers' Seminary. Algebra. *Two hours credit.* Professor BEMAN.

Courses 19 and 20 are open to those who have completed Courses 1, 2 (or 1E, 2E), 3, and 4.

23. Projective Geometry, II. *Three hours credit.* Professor BRADSHAW.

Analytic projective geometry, including homogeneous coördinates in two and three dimensions, conics, and quadric surfaces, an introduction to the theory of invariants, and line geometry.

25. Differential Geometry, I. *Two hours credit.* Assistant Professor NELSON.

27. Theory of Numbers, I. *Two hours credit.* Professor KARPINSKI.

29. Advanced Calculus, with Especial Reference to Applications in Harmonic Analysis. *Three hours credit.* Professor FORD.

Adapted to those who have completed Courses 3 and 4, or the equivalent. General topics such as the following are first considered: definite integrals, with especial reference to *improper* integrals; directional derivatives; line, surface, and space integrals; Green's theorem; the derivation of Laplace's equation and other partial differential equations of mathematical physics from elementary considerations. Applications are then made to problems in heat conduction, determination of potential, and acoustics. In the early part of the course Byerly's *Integral Calculus* is used as a text, and in the latter part Byerly's *Fourier's Series and Spherical Harmonics.*

31. Theory of Functions, including the Theory of Elliptic Functions. Advanced Course, I. *Two hours credit.* Professor MARKLEY.

33. Advanced Mechanics, I. *Three hours credit.* Professor FIELD.

37. Mathematical Theory of Elasticity, I. *Two hours credit.* Professor ZIWET.

41. Infinite Series and Products, I. *Two hours credit.* Professor FORD.

47. History of Mathematics (I). Lectures, discussions, and required readings. *Two hours credit.* Professor KARPINSKI.

This course is especially planned to give prospective teachers of secondary mathematics a survey of the historical development of the elementary branches—arithmetic, algebra, geometry, trigonometry, and the beginnings of analytic geometry and the calculus—from early times to the present. Some attention will also be paid to an historical treatment of the methods of teaching the science. A reading knowledge of French or German is highly desirable.

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49. Elementary Methods in Statistics. *Two hours credit.* Assistant Professor CARVER.
This course deals with the construction of schedules, gathering data, editing schedules, arranging and presenting statistics in various tabular and graphical forms.

51. Introduction to the Mathematical Theory of Interest. *Three hours credit.* Professor GLOVER, Assistant Professor CARVER, and Mr. BARNARD.

52. Introduction to the Mathematical Theory of Insurance. *Three hours credit.* Assistant Professor CARVER.

53. Finite Differences. *Three hours credit.* Professor GLOVER.
This course includes a study of numerous interpolation formulas, special functions occurring in finite difference theory, finite integration, summation of series, and solution of elementary difference equations.
Course 53 is open to those who have completed Courses 3 (or 3E, or 3*a*), 4 (or 4E, or 4*a*), and 52.

55. Advanced Mathematical Theory of Interest and Life Contingencies, I. *Four hours credit.* Professor GLOVER.

57. Graphical Methods (I). *Two hours credit.* Professor RUNNING.

59. Mathematical Theory of Statistics. Advanced Course. *Two hours credit.* Mr. BARNARD.
This course will include a study of the higher characteristics of frequency distributions and methods of graduating statistical series as developed by Pearson and Charlier.

67. Casualty Actuarial Theory. *Three hours credit.* Assistant Professor CARVER.
A study of the theory and calculation of premiums and reserves for health, accident, workmen's compensation, and other branches of casualty insurance.
Additional courses in Mathematics will be found in the Announcement of the Graduate School.

SECOND SEMESTER

See notes at the beginning of announcement of courses in mathematics in regard to first-year elections.

C. Algebra and Geometry. *Four hours credit.* Assistant Professor COE, and Mr. JOHNSON.

1. Algebra, Trigonometry, and Analytic Geometry. *Four hours credit.* Assistant Professor COE, Mr. PETERSON, Mr. HALBERT, Mr. ANNING, and Mr. FIELD.

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1E. Algebra and Analytic Geometry. *Four hours credit.* Professor FORD.

2. Continuation of Course 1. *Four hours credit.* Professors MARKLEY, KARPINSKI, and BRADSHAW, Assistant Professor COE, Mr. JOHNSON, Mr. PETERSON, Mr. BARNARD, Mr. ANNING, Mr. FIELD, and Mr. HALBERT.

2E. Continuation of Course 1E. *Four hours credit.* Professor FORD, Mr. JOHNSON, Mr. FIELD, and Mr. HALBERT.

3*b*. Calculus, I. *Four hours credit.* Assistant Professor COE.

4. Calculus, II. *Four hours credit.* Professor BEMAN.

4E. Calculus, II. *Five hours credit.* Professor MARKLEY.

4*a*. Calculus, Shorter Course, II. *Three hours credit.* Professor BRADSHAW.

6. Advanced Analytic Geometry. *Three hours credit.* Professor BRADSHAW.
A general survey of some of the methods of modern geometry will be given as an introduction to synthetic and analytic projective geometry. Some of the topics treated will be double ratio, the involution, line coördinates, abridged notation, parameter equations, systems of conics, geometry of the triangle and circle imaginary elements.

8. Projective Geometry, I. *Three hours credit.* Professor BRADSHAW.
Synthetic projective geometry based largely on the works of Enriques and Reye.

12. Theory of Functions of a Complex Variable, II. *Three hours credit.* Professor MARKLEY.

14. Higher Algebra, II. *Three hours credit.* Professor KARPINSKI.
This course is a continuation of Course 13, and consists of a more formal introduction to the subjects usually studied in a course in the theory of equations and higher algebra.

16. Theory of Functions of a Real Variable, II. *Three hours credit.* Professor MARKLEY.

18. Higher Plane Curves. *Two hours credit.* Professor BEMAN.
Course 18 is intended to give an introduction to the study of algebraic curves, with special consideration of curves of the third and fourth orders. Reference will be made to the works of Salmon, Clebsch-Lindemann, Wieleitner, and Loria.

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20. Teachers' Seminary. Geometry. *Two hours credit.* Professor BEMAN.

22. Advanced Differential and Integral Calculus. *Three hours credit.* Professor BEMAN.
Course 22 is intended to give students of the calculus a reading knowledge of some modern French work on analysis. Goursat's *Cours d'Analyse*, in the French or in Hedrick's translation, will be used in 1920-1921. Many problems from other sources will be discussed.

24. Advanced Projective Geometry. *Three hours credit.* Professor BRADSHAW.
A continuation of Courses 8 and 23.

26. Differential Geometry, II. *Two hours credit.* Dr. NELSON.

28. Theory of Numbers, II. *Two hours credit.* Professor KARPINSKI.

30. Advanced Calculus. *Three hours credit.* Professor FORD.
A continuation of Course 29, using Byerly's *Fourier's Series and Spherical Harmonics.* Consideration of Legendre Functions, Bessel Functions, etc., and their applications in mathematical physics.

32. Theory of Functions. Advanced Course, II. *Two hours credit.* Professor MARKLEY.

34. Advanced Mechanics, II. *Three hours credit.* Professor FIELD.

36. Vector Analysis. *Three hours credit.* Professor ZIWET.

38. Mathematical Theory of Elasticity, II. *Two hours credit.* Professor ZIWET.

42. Infinite Series and Products, II. *Two hours credit.* Professor FORD.

48. History of Mathematics, II. *Two hours credit.* Professor KARPINSKI.

50. Mathematical Theory of Statistics. Introductory Course. *Two hours credit.* Assistant Professor CARVER.
This course deals with the elementary theory and applications of mathematical statistics, and will include a study of such topics as averages, measures of dispersion, and coefficients of correlation.

51. Introduction to the Mathematical Theory of Interest. *Three hours credit.* Assistant Professor CARVER, and Mr. BARNARD.

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52. Introduction to the Mathematical Theory of Insurance. *Three hours credit.* Professor GLOVER, Assistant Professor CARVER, and Mr. BARNARD.

54. Theory of Probability. *Three hours credit.* Professor GLOVER. This course deals with fundamental concepts and seeks to establish the connection between *a priori* and empirical probabilities. Much time is also given to the application of theorems in selection, arrangement, distribution, and derangement to the solution of problems in choice and chance.

56. Advanced Mathematical Theory of Interest and Life Contingencies, II. *Four hours credit.* Professor GLOVER.

60. Mathematical Theory of Statistics. Advanced Course. *Two hours credit.* Mr. BARNARD.
This is a continuation of Course 59, by which it must be preceded.

68. Seminary in Casualty Actuarial Theory. *Three hours credit.* Assistant Professor CARVER.
The preparation of various schedules which supplement the annual statements, and a study of current articles dealing with problems in casualty insurance, form the basis of this course.
Additional courses in mathematics will be found in the Announcement of the Graduate School.

SUMMER SESSION OF 1921

80. Plane Geometry. *For entrance.* Assistant Professor CARVER.

81. Solid Geometry. *For entrance.* Professor ————.

83. Trigonometry. *Two hours credit.* Professor KARPINSKI.

84. Algebra. *Two hours credit.* Assistant Professor COE.

2. Analytic Geometry. *Four hours credit.* Assistant Professor COE.

86. Teachers' Course in Geometry and Algebra. *Two hours credit.* Professor BEMAN.

3. Calculus. *Four hours credit.* Professor BRADSHAW.

89. Calculus. *Three or five hours credit.* Assistant Professors ROUSE and HOPKINS.

49. Mathematical Theory of Statistics. *Two hours credit.* Assistant Professor CARVER.

51. Introduction to Mathematical Theory of Interest. *Two hours credit.* Professor GLOVER.

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52. Introduction to the Mathematical Theory of Interest and Insurance. *Two hours credit.* Assistant Professor CARVER.

63. Actuarial Exercises and Problems. *Two hours credit.* Assistant Professor CARVER.

96. Algebra. *Two hours credit.* Professor FORD.

For Graduates and Undergraduates.

48. History of Mathematics. *Two hours credit.* Professor KARPINSKI.

53. Finite Differences. *Two hours credit.* Professor GLOVER.

54. Theory of Probability. *Two hours credit.* Professor GLOVER.

90. Differential Equations. *Two hours credit.* Professor BEMAN.

94. Advanced Geometry. *Two hours credit.* Professor BRADSHAW.

97. Advanced Calculus. *Two hours credit.* Professor FORD.

MEDICAL SCIENCES

These courses may not be counted towards the hours of Literary credit required for the Combined Curricula.

Bacteriology, Hygiene, Physiological Chemistry

The student who expects to specialize in any one of these subjects should have a good training in the fundamental courses in chemistry. The minimal requirements are Courses 1 and 2 in General Hygiene.

SECOND SEMESTER

1. General Hygiene. *Three hours credit.* Lectures. Professor VAUGHAN.

2. General Bacteriology. *Five hours credit.* Lectures. Professor NOVY.

4. Advanced Bacteriology. *Three hours credit.* Deposit, $15. Laboratory work. Professor NOVY.

4*a*. Serum Reactions and Pathogenic Protozoa. *Three hours credit.* Laboratory work. Professor NOVY.

Courses 4 and 4*a* are to be elected together. They are open only to a limited number of students, who must file their applications at least two weeks before the opening of the semester. The deposit of $15 covers both courses.

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13. Food Conservation. *Three hours credit.* Lectures. Assistant Professor EMERSON.

14. Practical Study of Foods. Deposit, $5. Assistant Professor EMERSON.

Courses 13 and 14 are to be taken together for *three hours credit.*

EITHER FIRST OR SECOND SEMESTER

5. Water Analysis. *Three hours credit.* Deposit, $10. Laboratory work. Professor VAUGHAN and Mr. CHAMBERS.

6. Food Analysis. *Three hours credit.* Deposit, $10. Laboratory work. Professor VAUGHAN and Dr. SMITH.

7. Research Work in Hygiene. *Credit to be arranged.* Professor VAUGHAN.

11. Research Work in Bacteriology and Protozoölogy. *Credit to be arranged.* Room 218. Professor NOVY and Assistant Professor DEKRUIF.

Physiology

The courses in physiology are arranged for those who intend to become physicians and dentists; nevertheless, these courses are open to those who have had sufficient preliminary training in physics and chemistry, and courses in biology, particularly vertebrate anatomy and histology. The work would be valuable to those who contemplate specializing in physiology, biology, or psychology.

Course 1, intended especially for medical students and those who wish to specialize in physiology, consists of lectures and recitations dealing with general physiology, secretion, digestion, absorption, the function of ductless and other similar glands, assimilation, and the regulation of the temperature of the body. Emphasis is laid on the physical side of these processes, as there is a course in physiological chemistry provided for medical students.

Course 2, which is a continuation of Course 1, deals with respiration, circulation, and the physiology of muscle and nerve, and of the central nervous system.

Course 3 is a laboratory course, which should be preceded by, at least, Course 4, or some course in general physiology more advanced than those given in secondary schools. In the laboratory the student learns the use of the apparatus and methods employed in ordinary physiological experimentation, and personally observes many of the more important physiological processes. Especial attention is given to the physiology of man, the students alternating as subject and observer.

Course 4, intended primarily for dental students, covers the ground of Courses 1 and 2, but more rapidly, and is probably more desirable for those who wish to obtain a general view of physiology,

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but do not intend to specialize in the subject. It should be preceded by courses in physics and chemistry biology, vertebrate anatomy, and histology.

Course 5 is a course in physiological research, and is open only to advanced students.

FIRST SEMESTER

2. Lectures and recitations. Continuation of Course 1. *Four hours credit.* Daily, beginning March first. Professor LOMBARD.

3. Laboratory work. *Three hours credit.* Given in two sections, in the first and last half of the semester. Professor LOMBARD and Assistant Professor COPE.

SECOND SEMESTER

1. Lectures and recitations. *Five hours credit.* Professor LOMBARD.

4. Lectures and recitations. *Five hours credit.* Assistant Professor COPE.

5. Research work. *Credit to be arranged with the instructor.* Professor LOMBARD.

Anatomy

1. Systematic Course in Gross Human Anatomy. The course is repeated in periods of about twelve weeks each. October to December, January to April. Daily, afternoons, 1:00 to 5:30. Professor MCCOTTER and Assistants.

1*a*. Systematic Course in the Anatomy of the Upper Part of the Body, including the abdomen, pelvis, and lower extremities. *Six hours credit.*

1*b*. Systematic Course in the Anatomy of the Lower Part of the Body, including the abdomen, pelvis, and lower extremities. *Six hours credit.*

In this course the student makes a complete dissection of the entire human body, and at the same time the bony framework is studied from bones loaned for this purpose. In each section the student completes the dissection of one-half of the entire body. The dissections are carried out under the guidance of the members of the staff. Daily conferences are held, consisting of recitations and reviews in which the more important features are considered and their morphological and embryological significance discussed.

2. Embryology, Histogenesis, General Histology, Organology, and Anatomy of the Special Sense Organs and Central Nervous

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System. Two portions with *six hours credit each.* Lectures, recitations, and laboratory work. Professor HUBER and Assistants.

It is the aim in this course to interpret the adult structure of the elementary tissues and organs through their development and histogenesis. In that portion of the course devoted to the study of the central nervous system a complete dissection of the human brain is undertaken and the brain stem is studied by the use of a series of mounted cross-sections. Special consideration is given to the more important motor, sensory, and association paths.

Metallurgy

(See Chemistry)

MINERALOGY AND PETROGRAPHY

(GROUP II)

All courses offered by this department are given in the Mineralogical Laboratory which is located in the northeast corner of the new Natural Science Building. The mineral collections, Room M 222, are open for inspection daily throughout the session, from 9 to 12 A. M., and 2 to 4 P. M.

Courses 1, 2, 17, and 17*a* are beginning courses. Course 1 is open to all students desiring an elementary knowledge of Mineralogy, and is given both semesters. Course 1 may be followed to advantage by Courses 4 and 5, or 9. Those desiring a more comprehensive beginners' course are advised to elect Course 2, which serves as the basis for the more advanced work of the department. Course 17 is designed to give a general knowledge of gems and gem minerals, and is open to all students, no previous training in mineralogy or the sciences being necessary. Students desiring a more intimate knowledge of gems should also elect the laboratory work, designated as Course 17*a*. Students of Chemistry and Chemical Engineering are advised to take Courses 2 and 5, or Courses 1, 4, and 5. Students of Forestry are required to take Courses 1 and 9, and are advised to elect, if possible, Courses 4 and 5. For advanced students of Geology, Courses 2, 5, 6, 9, 10, and 11 are strongly recommended.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24. Professor KRAUS, 9 to 9:30 A. M., daily. Room M 227, N. S.

FIRST SEMESTER

1. Elements of Mineralogy. Lectures and laboratory work. *Two hours credit.* Professor KRAUS, Assistant Professor PECK, and Mr. SLAWSON.

This course includes the elements of crystallography, physical

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and chemical properties, occurrence, uses, and determination of the more common minerals. For this course a knowledge of elementary inorganic chemistry is necessary.

2. General Mineralogy. Lectures and laboratory work. *Five hours credit.* Professors KRAUS and HUNT, and Assistant Professor PECK.
Students who have successfully completed Course 1 may elect this course as Course *2a* and receive *three hours credit.*
Principles of crystallography, physical and chemical properties, origin, formation, decomposition, distribution, uses, and determination of the more important minerals.
Prerequisites: Chemistry 2 and 3.

3. Crystal Measurements. Measurements, calculation, and projection of crystals. Lectures and laboratory work. *Three hours credit.* Professor HUNT and Mr. SLAWSON.
This course is given both semesters and may be pursued for either one or two semesters.
Prerequisite: Course 2.

4. Determinative Mineralogy. Laboratory work. *Two hours credit.* Professor HUNT and Mr. SLAWSON.
Intended for students who have completed Course 1 or 2 and wish to become more proficient in the determination of minerals by means of their physical characters.

5. Qualitative Blowpipe Methods. *Two hours credit.* Lectures and laboratory work. Professor HUNT.
This course involves the use of blowpipe reactions upon charcoal and plaster tablets, as well as other chemical methods useful in the determination of minerals.
Prerequisites: Course 2 or Courses 1 and 4 in Mineralogy, or Courses *3a* and *3b* in chemistry.

6. Physical Crystallography. Lectures and laboratory work. *Four hours credit.* Professor KRAUS and Assistant Professor PECK.
This course involves a critical study of the various properties of crystals, including the use of the polarizing microscope and other crystallographic optical instruments.
Must be preceded by Course 2, and, if possible, by Course 3.
Students desiring to study only the optical properties of crystals may elect this course as *6a* and receive *three hours credit.*

7. Current Literature of Mineralogy. *One or two hours credit.* Professor HUNT and Assistant Professor PECK.
This course consists of discussions, translations, and abstracts of important current literature.

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8. Research Work. Laboratory work. *Credit to be arranged.* Professors KRAUS and HUNT, and Assistant Professor PECK.
For students who are properly qualified, opportunity is given for original research along the lines of crystallographic measurements, chemical crystallography, the formation and origin of minerals blowpipe methods, and petrography.

9. Lithology. Lectures and laboratory work. *Two hours credit.* Lectures and laboratory work. Professor HUNT and Mr. SLAWSON.
The lectures include, aside from a review of the rock-forming minerals, a discussion of the origin, modes of occurrence, alterations, methods of determination and uses of the more important rocks. In the laboratory the student is required to determine by means of the macro-physical properties a large number of rock specimens. Field excursions will also be made in order to acquire facility in the rapid determination of rocks in the field.
Prerequisites: Mineralogy 1 and Geology 1.

10. Petrography. Lectures and laboratory work. *Three, four, or five hours credit.* Lectures and laboratory work. Professor HUNT.
After reviewing the optical characters and methods of investigation of crystals, the various properties of the important rock minerals are discussed in detail. The mineralogical and chemical composition, texture, genesis, forms of occurrence, and metamorphism of rocks are then studied. The laboratory work is devoted to the systematic study of rock minerals and rocks, with the aid of the polarizing microscope.
Prerequisites: Mineralogy 2 or 1, and 4, 6, or 6*a*, and 9.

12. Quantitative Blowpipe Methods. Reading and laboratory work. *Two hours credit.* Professor HUNT.
Practice in assaying by blowpipe methods of various kinds of ores, especially those of gold, silver, copper and lead.
Prerequisite: Course 5.

15. Advanced Qualitative Blowpipe Analysis. Reading and laboratory work. *Credit to be arranged* . Professor HUNT.
This course involves the application of blowpipe and other chemical methods in determining the less common minerals, and those containing some of the rarer elements.
Prerequisites: Mineralogy 5 and Chemistry 3 or 3*a* and 3*b*.

SECOND SEMESTER

1. Elements of Mineralogy. Lectures and laboratory work. *Two hours credit.* Professor KRAUS, Assistant Professor PECK, and Mr. SLAWSON.

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This course includes the elements of crystallography, physical and chemical properties, occurrence, uses and determination of the more common minerals. For this course a knowledge of elementary inorganic chemistry is necessary.

17. Gems and Precious Stones. Lectures and demonstrations. *Two hours credit.* Professor KRAUS and Mr. SLAWSON.

This course discusses the general properties, occurrence, determination, and history of the various minerals used as gems and gem minerals. The various methods of distinction, especially from imitations and synthetic gems, will also be considered. No previous training in mineralogy or the sciences is required, although an elementary knowledge of chemistry and physics is highly desirable.

[17*a*. Gems and Precious Stones. Laboratory work. *One hour credit.* Professor KRAUS and Assistants.

Students will be given an opportunity to familiarize themselves with the various methods used in the scientific determination of gems and gem minerals. Three hours a week in the laboratory to be arranged. Must be accompanied or preceded by Course 17. Omitted in 1920-1921.]

3. Crystal Measurements. Measurement, calculation, and projection of crystals. Lectures and laboratory work. *Three hours credit.* Professor HUNT and Mr. SLAWSON.

This course is given both semesters and may be pursued for either one or two semesters.

Prerequisite: Course 2.

4. Determinative Mineralogy. Laboratory work. *Two hours credit.* Professor HUNT and Mr. SLAWSON.

Intended for students who have completed Course 1 or 2 and wish to become more proficient in the determination of minerals by means of their physical characters.

8. Research Work. Laboratory work. *Credit to be arranged.* Professors KRAUS and HUNT, and Assistant Professor PECK.

For students who are properly qualified opportunity is given for original research along the lines of crystallographic measurements, chemical crystallography, the formation and origin of minerals, blowpipe methods, and petrography.

9. Lithology. Lectures and labiratory work. *Two hours credit.* Professor HUNT and Mr. SLAWSON.

This lecture includes, aside from a review of the rock-forming minerals, a discussion of the origin, modes of occurrence, alterations, methods of determination, and uses of the more im-

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portant rocks. In the laboratory the student is required to determine by means of the macro-physical properties a large number of rock specimens. Field excursions will also be made in order to acquire facility in the rapid determination of rocks in the field.

11. Petrography. Lectures and laboratory work. *Three, four, or five hours credit.* Professor HUNT.
This is a continuation of Course 10.

16. Mineralogy and Lithology. Lectures and laboratory work. *Three hours credit.* Professor HUNT and Mr. SLAWSON.
This course is designed primarily for students of architectural engineering, but may be pursued by students of this college with special permission of the instructor. The first half of the course treats of the elements of crystallography, the physical and chemical properties, uses and determination of the common rock forming minerals, and of those ores from which the metals and materials commonly used for building purposes are obtained. The second half is devoted to a discussion of the origin, modes of occurrence, description, and uses of the common rocks, with special emphasis upon those used for structural and decorative purposes. Lectures are also given on the methods of quarrying, finishing, and testing of building stones.
For this course a knowledge of elementary inorganic chemistry is necessary.

SUMMER SESSION OF 1921

1. Elements of Mineralogy. *Two hours credit.* Assistant Professor PECK, and Mr. ————.

4. Determinative Mineralogy. *Two hours credit.* Assistant Professor PECK, and Mr. ————.

5. Qualitative Blowpipe Methods. *Two hours credit.* Assistant Professor PECK.

9. Lithology. *Two hours credit.* Assistant Professor PECK, and Mr. ————.

8. Special Work. *Credit to be arranged.* Assistant Professor PECK.

MUSIC

The courses in Music open to students who evince sufficient ability to pursue them with profit, and are subject to the general rule regarding elections. As all the courses in music run through the entire year, the students are earnestly advised to take them both semesters. The instruments in the Stearns Collection, an "Aeolian Or-

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chestrelle," a "Pianola," "Victor" records, and lantern slides are used for purposes of illustration.

PRACTICAL MUSIC.—Credit, not to exceed two hours per semester, will be given for advanced work in Pianoforte, Organ, Violin, Singing, and Advanced Public School Methods, taken in the University School of Music under conditions given below. (See Courses 17 and 18.)

CONSULTATION HOURS.—During the period of registration, daily, 10-12, at Registrar HALL'S office.

FIRST SEMESTER

TECHNICAL COURSES.—1, 3, 5, 7, and 17. (Course 7 is intended primarily for graduates, but is open to undergraduates who receive special permission.)

1. Science of Harmony. *Two hours credit.* Assistant Professor MOORE.
   In this course, as in the other technical courses, the student is encouraged to make a practical application of the subject through creative work of a nature conditioned by the scope of the course and the ability of the student.
   By devoting two extra periods (hours to be arranged) the student may secure one hour additional credit.

3. Simple Counterpoint. *Two hours credit.* Assistant Professor MOORE.

7. Canon and Fugue. *Two hours credit.* Professor STANLEY.

17. Advanced Practical Music. *One or two hours credit.*
   This course may be elected only by written permission of Professor STANLEY, and all elections must be in his name. It may be elected thereafter as 17*a* or 17*b*, if deemed advisable or deserved, under the same condition.

Historical and Critical Courses—1*a*, 9, 11, 13, 15.

1*a*. Creative Listening. *Three hours credit.* Professor STANLEY.
   In this course, which requires no preparatory training, students are led to an appreciation of the best music through systematic and directed listening, supplemented by the study of the best critical writers. The opportunities for hearing good music, elsewhere stated, will in this manner become increasingly stimulating and valuable, and must be utilized as a condition of receiving credit.

9. History of Music. From the Christian Era to the Beethoven Period. *Three hours credit.* Professor STANLEY.

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13. Evolution of Musical Instruments. *Two hours credit.* Professor STANLEY.

[15. Seminary. Bach, Beethoven, and Brahms. *Two hours credit.* Professor STANLEY.
The subjects covered each year being different in nature and scope, this course may be re-elected with Professor STANLEY's consent. Omitted in 1920-1921.]

19. Musical Analysis. *Two hours credit.* Assistant Professor MOORE.

SECOND SEMESTER

Technical Courses.

2. Science in Harmony. *Two hours credit.* Assistant Professor MOORE.

4. Simple Counterpoint. *Two hours credit.* Assistant Professor MOORE.

6. Double Counterpoint. *Two hours credit.* Assistant Professor MOORE.

8. Canon and Fugue. *Two hours credit.* Professor STANLEY.

18. Advanced Practical Music. *One or two hours credit.*
This course may be elected only by written permission of Professor STANLEY, and all elections must be in his name. It may be elected again as 18*a* or 18*b*.

Historical and Critical Courses

2*a*. Creative Listening. A continuation of Course 1*a*. *Three hours credit.* Professor STANLEY.

10. History of Music. From the Beethoven period to the Ultra Moderns. *Three hours credit.* Professor STANLEY.

14. Evolution of Musical Instruments. *Two hours credit.* Professor STANLEY.

[16. Seminary. Continuation of Course 15. *Two hours credit.* Professor STANLEY.
The subjects covered each year being different in nature and scope, this course may be re-elected with Professor STANLEY's consent. Omitted in 1920-1921.]

20. Musical Analysis. Continuation of Course 19. *Two hours credit.* Assistant Professor MOORE.

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Old Bulgarian

(See Indo-European Languages and Literatures)

Old Norse

(See Germanic Languages and Literatures)

PHILOSOPHY AND PSYCHOLOGY

IMPORTANT NOTICE TO STUDENTS.—There is such wide diversity in the preparation, needs, and aims, of individual students that the department cannot lay down inflexible rules with regard to sequence of courses.

Students are advised that courses under *A* come first. Those who have elected no course under *A* should not elect any course under *B* without permission from the instructor.

As a general rule, students should begin with Course 1 in Philosophy, or Course 7 in Psychology.

Students desirous of specializing in Philosophy must begin with Course 1. Further work will be mapped out to meet particular needs.

GRADUATE WORK.—Candidates for higher degrees in Philosophy are requested to communicate with Dean LLOYD as soon as possible—preferably before entering.

RELATED COURSES.—Various departments offer courses of special value to students of philosophy. The instructors will be glad to point out the more useful related courses to any student who may make application.

PHILOSOPHICAL SOCIETY.—The Acolytes is a society to which students, who have distinguished themselves in philosophy, may be elected on recommendation of the faculty.

PSYCHOLOGICAL LABORATORY.—The Psychological Laboratory occupies forty rooms of various sizes in the Natural Science building. The rooms are amply supplied with water, gas, high and low voltage currents to furnish power and to replace primary batteries in ordinary experiments.

The equipment includes a complete set of the apparatus required for demonstration and class use, models of the brain and sense organs, a full set of reaction-time instruments, and an unusually large collection of pieces for recording bodily expressions during effective states. The laboratory is particularly well equipped for experiments on sound, and there is an adequate supply of instruments for work in other lines. Such apparatus as is needed for advanced work or research will be procured as required, and many of the newest appliances are added each year. Every facility and encouragement are offered to students of sufficient preliminary training to undertake investigations on some special problem.

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GROUP REQUIREMENTS FOR GRADUATION.—All the courses offered in this department which are listed under the caption Philosophy fall under Group III (see page 138). Courses in Psychology, and so listed, fall under Group II.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24, a department representative, daily, 11-12. Room 106, M. H.

Philosophy

(GROUP III)

FIRST SEMESTER

A. Introductory Courses. (See notice above.)

1. Philosophical Introduction. Lectures, discussion, sections, exercises. *Three hours credit.* Professors WENLEY, LLOYD, VIBBERT, PARKER, and Mr. TRAP.

The object of this course is to explain to beginners in the most elementary manner possible, the meaning, interest, and scope of philosophy; to compare its outlook with other standpoints, such as those of the average man (common-sense), of history, and of science (including psychology). This is a *three-hour* course; every student will attend one discussion section per week; this in addition to the two lectures; after the beginning of the semester, the class will be divided into sections for this purpose, and each student will have an opportunity of electing the hour most suitable for the section work.

7. Elementary General Psychology. See under Psychology.

2. Ethics. Introduction to the Study of Moral Institutions. Subject in 1920-21:—Roman and Mediaeval Cosmopolitanism with special reference to its bearing upon contemporary "Internationalism." Text-book: G. S. Brett, *The Government of Man. Two hours credit.* Professor WENLEY.

3. Introduction to Logic. Lectures, collateral reading, and text-book work. Text-book: Sellars' *Essentials of Logic.* Course 1 is a natural prerequisite to this course. *Three hours credit.* Professor SELLARS.

4. Introduction to Systematic Ethics. Lectures, discussions, and assigned readings. *Three hours credit.* Professor SELLARS.

This course is designed primarily as an introduction to systematic ethics. The first part will concern itself with the theory or moral conduct, while the latter part will be devoted to social problems of ethical significance.

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6. Introduction to Aesthetics. Lectures, prescribed reading, and a thesis. *Three hours credit.* Assistant Professor PARKER.
The definition, forms, and standard of Beauty. The application of general æsthetic principles in poetry and the fine arts. The relation of art to science, morality, religion, and philosophy. Lectures, reading, and a thesis. Text-book. Parker's *The Principles of Aesthetics.*

8. Introductory Physiological and Experimental Psychology. Sensation, Attention, Association. See under Psychology.

B. Second Courses.

9*a*. History of Ancient Philosophy from Thales through Aristotle. Lectures, reading, exercises. *Three hours credit.* Professor LLOYD.
Open to approved students who have had any one of the introductory courses or an equivalent.

10. The Philosophy of Plato. *Three hours credit.* Assistant Professor PARKER.
A study of the chief Dialogues (in translation). Lectures, discussions, and prescribed reading.

12. Contemporary French Philosophy. A general survey of the main currents of French philosophical thought today in their relations to economic, social, artistic, religious, and cultural tendencies. Professor VIBBERT.

14. Metaphysics. A study of ultimate problems:—substance, law and individuality, purpose and casualty, the one and the many, the self and nature. *Three hours credit.* Assistant Professor PARKER.

C. Courses for Undergraduates with Permission and for Graduates.

16*a*. Political Philosophy. Lectures, discussions, theses. *Two hours credit.* Professor LLOYD.
A history of the theories of society, ancient and modern. Attention will be given especially to the contract theory of the seventeenth and eighteenth centuries.

17. Seminar in Contemporary Epistemology. This course is designed for graduates, and seniors with permission. Reports, readings, and discussions. *Three hours credit.* Professor SELLARS.

D. Courses for Graduates Only.

33 (*a, b, c, etc.*). Seminaries will be organized as required. Professors WENLEY, LLOYD, VIBBERT, and SELLARS, and Assistant Professor PARKER.

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SECOND SEMESTER

A. Introductory Courses, (see notice prefixed to announcement of courses in this department).

1. Philosophical Introduction. *Three hours credit.* Same as in first semester (which see). Professors WENLEY, LLOYD, VIBBERT, Assistant Professor PARKER, and Mr. TRAP.

3. Introduction to Logic. Lectures, collateral reading, and text-book work. Text-books: Sellars' *Essentials of Logic.* Course 1 is the natural prerequisite to this course. *Three hours credit.* Professor SELLARS.

5*h*. Ethics of Social Movements: a Study of Ethical Types as seen in Social and Industrial Relations. *Two hours credit.* Professor WENLEY.

This course is designed specially for students of (1) history, (2) law and sociology, (3) commerce and administration. The problems will be approached from the standpoint of social organization. The ethical significance of social, and political institutions will be considered, also the relation of these institutions to the conditions of moral progress and stability in a society. Subject in 1920-1921: The Ways of Group-Life. Students are advised that *three* courses fall under 5, distinguished by letters following the No. 5. As each course is complete in itself, all may be elected, and in any order. They deal with phases of ethical and social development subsequent to the French Revolution.

6. The History of Æsthetics. *Three hours credit.* Assistant Professor PARKER.

The development of æsthetic theory in relation to the contemporaneous social, philosophical, and artistic movements. The analysis and discussion of representative contributions to this theory. Special attention will be paid to the modern period beginning with Kant. Lectures, reading, and reports.

B. Second Courses.

9*b*. History of Modern Philosophy from St. Augustine, through Kant. Lectures, reading, and reports. *Three hours credit.* Professor LLOYD.

The course is open to approved students who have had any one of the introductory courses or an equivalent. Course 11*a*, while not required, furnishes desirable preparation for this course.

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11. The Philosophy of Aristotle. Special attention will be given to the *Metaphysics, Psychology, and Ethics. Three hours credit.* Assistant Professor PARKER.

13. The Philosophy of Henri Bergson and Emile Boutroux. A detailed exposition of the philosophy of the two most important contemporary French thinkers; the relations and contrast between their points of view. *Three hours credit.* Professor VIBBERT.

15. The Principles and Main Concepts of Science. *Three hours credit.* Professor SELLARS.
This course is designed primarily for students of Physics, Chemistry, and Biology, but is open to all who are interested in the philosophical aspects of science. The Postulates of science; the methods of science; the main concepts employed. Text-book: Sellar's *Essentials of Philosophy.*

C. Courses for Undergraduates with Permission and for Graduates.

16*b*. Political Philosophy—special course. *Two hours credit.* Professor LLOYD.
A critical study of society; the principles of political association and evolution; progress, the relations of political and industrial institutions to fundamental ideas of philosophy and religion; the personal and the social.
This course is recommended to students of history, to those who have had or intend to take Course 16*a*, and to students of economics and sociology.

17. A Critical Examination of Socialism. *Three hours credit.* Professor SELLARS.

18. Modern Logic. *Credit and hours to be arranged.* Assistant Professor PARKER.
An introduction to the study of the more recent developments of logical theory and their applications to the exact sciences. The elements of the theory of propositions, classes, relations, order, and number.

19. Problems of Human Conduct. *Two hours credit.* Professor LLOYD.
A study of the moral ideal, motive and judgment, of conscience and will. An elementary course in ethical theory, partly historical and partly critical and constructive.

D. Courses for Graduates Only.

33. As in first semester (which see).

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SUMMER SESSION OF 1921

Introductory Courses.

1*s*. Introduction to Philosophy. *Two hours credit.* Professor WENLEY.

9. Introduction to Logic. *Two hours credit.* Professor SELLARS.

For Graduates and Undergraduates.

5*s*. Introduction to Ethics. *Two hours credit.* Professor SELLARS.

12*s*. Philosophy of Religion. *Two hours credit.* Professor WENLEY.

Psychology
(GROUP II)

FIRST SEMESTER

A. Introductory Courses.

7. Elementary General Psychology. *Three hours credit.* One lecture and two discussion sections, with reports on outside reading. Text-book, Pillsbury, *Essentials of Psychology.* Professor PILLSBURY, Dr. GRIFFITTS, and Mr. BROWN.
A rapid survey of the facts of mind. Intended primarily for students of pedagogy, but open to others who are not interested in the experimental and physiological aspects of Psychology.

8*a, b, c*. Introductory Physiological and Experimental Psychology. Sensation, Attention, Association. *Three to five hours credit.* Professors PILLSBURY and SHEPARD, and Dr. GRIFFITTS.
It is suggested that six-year literary-medical students, students of biology, and others who desire more than the rudiments of psychology begin their work with this course. Lectures, discussion, and laboratory work. It may be elected as 8*a*, *three hours credit*, without laboratory work; as 8*c*, *four hours credit*, with two lectures and four hours of laboratory work; or as 8*e*, *five hours credit*, with two lectures, a discussion section, and four hours of laboratory work. Students who have had previous work in psychology and desire only the laboratory work and discussion sections may also elect it as a three-hour course. Text-book, Pillsbury's *Fundamentals of Psychology.*

B. Second Courses.

21. Mental Measurements and Certain Social Phases of Mental Pathology. *Two hours credit.* Professors PILLSBURY and BARRETT, and Mr. BROWN.
A review and criticism of methods of measuring mental capaci-

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ties, with actual practice. Professor BARRETT will discuss with clinical material certain aspects of disturbances of personality that bear on criminal cases.

22. General Comparative Psychology. *Two hours credit.* Professor SHEPARD.
An elementary course on animal behavior in relation to the human.

23. Psychology of Memory. *Two hours credit.* Professor PILLSBURY.
A study of the recent memory investigations. The results, methods, and instruments will be studied, and some of the more important experiments will be repeated. Some time will also be devoted to a study of the experimental investigations of legal evidence, the *Aussage* experiments of Stern and others.

26. Psychology of Salesmanship. *Two hours credit.* Professor ADAMS.
The study of the salesman, the buyer, the commodity, and the mental meeting ground, which includes the psychological discussion of attention, interest, desire, conviction, and action.
Prerequisite: Course 7 or 8, or five hours of Economics.

27. Business Psychology. *Two hours credit.* Professor ADAMS.
This course deals with the three-fold problem of employment selection, efficiency as affected by working conditions, and efficiency as affected by the motives of the worker.
Prerequisite: Course 7 or 8, or five hours of Economics.

C. Courses for Undergraduates with Permission and for Graduates.

30. Individual and Race Differences. *Two to five hours credit.* Dr. GRIFFITTS.
The nature, extent, causes, and significance of individual and race differences, with the emphasis on methods of measurement. The class will meet twice a week for lectures, reports, and discussions. In addition, each student will make a more intensive study of some problem which he may choose.
Prerequisite: Course 7 or 8.

31. Methods of Mental and Social Measurement. *Two hours credit.* Mr. BROWN.
Deals with the technical and statistical methods used in the study of mental, educational, and social problems. Among other topics, the course will include measurement of variable facts, measurement of changes, measurement of groups, measurement of relations, correlation, reliability of measurements, tables and surfaces of frequency, graphic methods. Lectures, reports, and the application of the methods to actual problems.

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[33. Physiological Psychology of the Senses. *Two hours credit.* Professor PILLSBURY.

A study of the main results and technique of the senses except vision. This with Course 41 will give a survey of the psychology of sensation. Given in 1920-1921.]

[34. The Psychology of Language. *Two hours credit.* Professors PILLSBURY and MEADER.

Among the subjects treated are the laws of thought and language as a form of expression, the genesis of speech, and the psychology of syntax.

Professor SCOTT will give four lectures on the origin of language. Omitted in 1920-1921.]

36. Advanced Applied Psychology. *Two or more hours credit.* Professor ADAMS.

a. Advertising. Reports on the literature of the subject and laboratory work on the more important psychological phases of advertising.

b. Experimental investigations on the problems of employment selection, the effect of environmental conditions upon the output, and the effect of the motives upon the output, together with reports on the literature of such subjects.

D. Courses Primarily for Graduates.

50. History of Modern Psychology. Primarily for graduates. *Two hours credit.* Professor PILLSBURY.

This course will present the more important tendencies in psychology from the Greeks to Locke, in an endeavor to give an historical origin of current theories.

51. Advanced Systematic Psychology. Lectures on attention, association, and the more complicated mental processes. *Three hours credit.* Professor SHEPARD.

52. Advanced Course in Experimental Psychology. Original investigation. *Credit and hours to be arranged.* Professors PILLSBURY, SHEPARD, and ADAMS.

53. Psychological Journal Club. The members of the teaching staff and the graduate students in psychology will meet every other Thursday night to review the current literature.

E. Graduate Seminaries.

54. Graduate seminaries will be organized as required. Professors PILLSBURY, SHEPARD, and ADAMS.

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SECOND SEMESTER

A. Introductory Courses.

7. Elementary General Psychology. Same as in first semester (which see). *Three hours credit.* Professors PILLSBURY and ADAMS, and Dr. GRIFFITTS, and Mr. BROWN.

8*b, d, f.* Introductory Physiological and Experimental Psychology. Feelings, emotions, and the higher intellectual processes. *Three hours credit.* Professors PILLSBURY and SHEPARD, and Dr. GRIFFITTS.

Continuation of Course 8*a*. This course may, by special permission, be elected as an introductory course without being preceded by Course 8*a*. It may be elected as 8*b, three hours credit;* as 8*d,* four hours credit, with two lectures and four hours of laboratory work; or as 8*f, five hours credit,* with two lectures, one quiz section, and four hours of laboratory work.

B. Second Courses.

28. Psychology of the Abnormal and Occult. *Two hours credit.* Professor PILLSBURY.

A critical survey of the more important facts of mental derangement that throw light upon the principles of general psychology. The more interesting forms of modern occultism will be considered in their bearings upon psycho-pathology.

25. Psychology of Advertising. *Two hours credit.* Professor ADAMS.

A survey of the psychological principles involved in advertising, with experimental study of the relative value of different types of advertisements.

The course may be elected as 25*a, three hours credit,* including one laboratory period at *hours to be arranged.* Laboratory limited to 20.

Prerequisite: Course 7 or 8, or five hours of Economics.

C. Courses for Undergraduates with Permission and for Graduates.

[41. Color Vision. *Two hours credit; hours to be arranged.* Professor SHEPARD.

Given in 1921-1922 and alternate years.]

[42. General Course in Experimental Phonetics. Lectures and laboratory work. *One or two hours credit.* Professors MEADER and SHEPARD.

This course, which is designed for students of language, psychology, oratory, and singing, will deal with the anatomy and physiology of the human voice, the production of speech sounds,

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description and classification of speech sounds, mechanical methods of recording speech sounds, study of speech records. As the number of students admitted to this course will be small, those desiring to elect it are advised to apply early to one of the instructors in charge.
Given in 1920-1921 and alternate years.]

43. Individual and Race Differences. Same as 30, first semester. *Two to five hours credit.* Dr. GRIFFITTS.

44. Psycho-physical Methods. *Two hours credit.* Dr. GRIFFITTS.
A discussion, with demonstrations and experiments, of the historic methods.

45. Special Problems in the Psychology of Advertising. *Two hours credit.* Professor ADAMS.
Advanced problems in the psychology of advertising to be selected to meet the demands of the students. Limited to 8.
Prerequisite: Course 25.

46. Psychology of Character. *Two hours credit.* Professor ADAMS.
A review and criticism of the methods which had been used for reading character, together with a constructive summary of the experimental work which has been performed in scientific laboratories upon this subject.

D. Courses Primarily for Graduates.

50*a*. History of Modern Psychology. Professor PILLSBURY. Continuation of Course 50.

57. Advanced Comparative Psychology. *Three houre credit.* Professor SHEPARD.
A study of the evolution of mental processes, and their comparative development in different forms. The lectures will be accompanied by laboratory work on the learning processes in animals.

58. The Central Nervous System and Mental Processes. *Two hours credit.* Professor SHEPARD.
Given in 1920-1921 and alternate years.

59. Laboratory Technique. A study of apparatus and methods. *One hour credit.* Professor SHEPARD.
Given in 1919-1920 and alternate years.

52*a*. Advanced Experimental Psychology. As in Course 52, in first semester. Professors PILLSBURY, SHEPARD, and ADAMS.

53*a*. Psychological Journal Club. As in first semester (which see).

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V. Graduate Seminaries.

54*a*. Graduate Seminaries. As in first semester (which see).

SUMMER SESSION OF 1921

Introductory Courses.

7*s*. Elementary Psychology. *Two hours credit.* Dr. GRIFFITTS.

For Graduates and Undergraduates.

8*s*. Experimental Psychology. *Two hours credit.* Dr. GRIFFITTS.

30*s*. Individual and Race Differences. *Two hours credit.* Dr. GRIFFITTS.

25*s*. Psychology of Advertising. *Two hours credit.* Assistant Professor ADAMS.

26*s*. Psychology of Salesmanship. *Two hours credit.* Assistant Professor ADAMS.

27*s*. Vocational Psychology. *Two hours credit.* Assistant Professor ADAMS.

46*s*. The Psychology of Character. *Two hours credit.* Assistant Professor ADAMS.

54*s*. Seminary in Psychology. *Credit to be arranged.* Professor SHEPARD.

55 Present Tendencies in Psychological Theory. *Two hours credit* Professor PILLSBURY.

56. Seminary in the Psychology of Reasoning. *Two hours credit.* Professor PILLSBURY.

28. Psychology of the Abnormal and Occult. *Two hours credit.* Professor PILLSBURY.

PHYSICS

(GROUP II)

Students entering without a preparatory course in physics will be allowed to enter Courses 1 and 2 only after they have completed Course Z.

Students expecting to teach physics in high schools should take at least the following courses: 1, 1*b*, 2, 2*b*, 5, 7, and 8.

The lectures in Courses 1, 2, 1E, and 2E are given in the large lecture room at the west end of the Physics Laboratory.

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Two hours of laboratory work will be required for *one hour credit.* No laboratory work can be taken in periods of less than two consecutive hours. There are no laboratory fees for courses in physics.

A suggested program in Physics is outlined on page 166.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24. Professor RANDALL, or a representative, will be in his office in the Physics building, 2:30 to 3:30 daily, to advise students desiring to elect courses in Physics.

FIRST SEMESTER

A. Courses Primarily for Undergraduates.

Z. Physics for Beginners. *Four hours credit.* Mr. CORK.

This course is intended for students who have not presented physics for admission and who wish to pursue studies in the department of Physics.

No credit toward graduation will be allowed for this course, unless it is followed by Course 1. It is not counted as part of the collegiate work in Physics required for admission to the Medical School.

1. General Physics: Mechanics, Sound, and Heat. *Four hours credit.* Lectures, recitations, and laboratory work. Professors RANDALL and COLBY, Assistant Professor LINDSAY, Dr. KENT, Mr. BABBITT, and Assistants.

Preparatory Physics and Plane Trigonometry are prerequisites for this course. It may, however, be elected at the same time as Mathematics I. Students who transfer their credits to the College of Engineering will be required to offer Courses 1 and 1*a* as the equivalent of Course 1*E*.

All elections, including those of upperclassmen, must be made through the Classification Committee.

1*a*. Problem Course. *One hour credit.* Assistant Professor SLEATOR.

This course may be taken in conjunction with Physics 1, or afterward. It is recommended for students preparing to teach.

All elections must be made through the Committee on Classification.

1*b*. Laboratory Work in Mechanics, Sound, and Heat. *One hour credit.* Assistant Professor RICH, and Assistants.

Hours same as for the laboratory work in Physics 1.

All elections, including those of upperclassmen, must be made through the Classification Committee.

2. General Physics. *Four hours credit.* Magnetism, Electricity, and Light. Lectures, recitations, and laboratory work. Assistant

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Professor RICH, Mr. BECKER, Mr. CORK, Mr. GEIGER, and Assistants.

This course must be preceded by Course 1. Students who transfer their credits to the College of Engineering will be required to offer Courses 2 and 2*a* as the equivalent of Course 2*E*.

All elections must be made through the Committee on Classification.

2*a*. Problem Course. *One hour credit.* Continuation of Course 1*a*. As given the first semester, this course is a part of Physics 2*E*.

All elections must be made through the Committee on Classification.

2*b*. Laboratory Work in Magnetism, Electricity and Light. *One hour credit.* Assistant Professor RICH, and Assistants.

All elections must be made through the Committee on Classification.

1*d*. General Physics. For dental students only. Professor RANDALL.

B. For Graduates and Undergraduates.

5. Electrical Measurements. Lectures, recitations, and laboratory. *Four hours credit.* Professor SMITH and an Assistant.

In the class work the principles of electrical behavior are critically studied and discussed. The laboratory exercises are designed to illustrate and emphasize these principles, and to give the student some personal experience in the careful use of electrical measuring instruments. The course includes the modern methods of measuring current, resistance, electromotive force, and power, and the calibration of the instruments employed, together with measurements of capacity, and the magnetization of iron.

Course 5 must be preceded by Courses 1 and 2, including laboratory work. A knowledge of calculus is also desirable.

7. Advanced Physics. *Four hours credit.* Assistant Professor LINDSAY.

This course is adapted to the work of those preparing to teach or to do graduate work in Physics. Courses 1 and 2 are prerequisite, and a knowledge of calculus is required.

9. Direct Current Machinery. Lectures and laboratory work. *Two hours credit.* Professor WILLIAMS.

11. Laboratory Work in Heat. *Two hours credit.* Dr. KENT.

A lecture and experimental course covering the fundamental principles of heat and offering the student a working knowledge of the modern methods of heat determinations. The laboratory work includes measurements of specific heats of

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solids, liquids, and gases; heats of fusion and vaporization; vapor pressures; thermal conductivities, critical temperatures, etc. The problems are chosen with a view to illustrating present methods of calorimetry and temperature measurement.

15. Electrochemical Physics. Lectures and laboratory work. *Two hours credit.* Professor HENDERSON.
This course offers a study, from the view point of physics, of the fundamental principles of electrochemistry. It is designed (a) to meet the needs of those preparing to teach physics and chemistry, (b) to furnish a basis for the application of electrochemical principles to practical problems in chemistry and electricity, and (c) to prepare for research in electrochemical physics.
Course 15 must be preceded by Courses 1, 2, including laboratory work.

17. Sound. Recitations and Laboratory Work. *Four hours credit.* Assistant Professor SLEATOR.
The class work is based on Barton's *Text Book on Sound,* with lectures and reference reading.

C. Primarily for Graduates.

21. Theoretical Mechanics. *Three hours credit.* Professor FIELD.
Geometry of Motion; kinematics of a particle and of a rigid body; statics; kinetics of a particle and of a rigid body; the problem of the top; relative motion; Lagrange's equations; general principles of mechanics.

25. Theory of Heat. *Two hours credit.* Professor RANDALL.
This is a theoretical course in which selected chapters from the subject of heat are discussed.

27. Theory of Electricity and Magnetism. *Three hours credit.* Professor COLBY.
This course should be preceded by a course in electrical measurements; a knowledge of calculus is also required.

29. Special Problems.
Research work on special problems under the direction of some member of the teaching staff. *Credit to be arranged.*

31. Thermodynamics and Gas Theory. *Three hours credit.* Professor COLBY.

33 Vacuum Tubes in Radio Communication. *Two hours credit.* Professor WILLIAMS.
Lectures and laboratory work.
The theory of the transmission of electricity through gases will

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be treated in this case together with a study of the different types of tubes used in radio work. The characteristics of such tubes will be determined experimentally and the electric circuits employed in their use will receive considerable attention.
Prerequisites: Course 5 in Physics and the Calculus.

37. Reading of German Texts and Journals. *One hour credit.* Professor LEE.
The purpose of this course is to cultivate facility in reading the German literature of Physics.

41. Seminary. This course will be in charge of various members of the department, depending upon the nature of the subject treated. *Two hours credit.*

43. Physics Colloquium.
Reports on original work, together with analysis and discussion of important articles in current physical literature. All instructors and assistants in the department take part in the Physics Colloquium.

SECOND SEMESTER

A. Courses Primarily for Undergraduates.

1. General Physics: Mechanics, Sound, and Heat. *Four hours credit.* Lectures, recitations, and laboratory work. Assistant Professor RICH, Mr. BECKER, Mr. CORK, Mr. GEIGER, and Assistants.
Students who transfer their credits to the College of Engineering will be required to offer Courses 2 and 1*a* as an equivalent of Course 1E.
Preparatory Physics and Plane Trigonometry are prerequisites for this course. It may, however, be elected at the same time as Mathematics 1. All elections, including those of upperclassmen, must be made through the Classification Committee.

1*a*. Problem Course. *One hour credit.*
As given the second semester this course is a part of Physics 1E.

1*b*. Laboratory Work in Mechanics, Sound, and Heat. *One hour credit.*

2. General Physics. *Four hours credit.* Magnetism, Electricity, and Light. Professors RANDALL and COLBY, Assistant Professor LINDSAY, Mr. KENT, Mr. BABBITT, and Assistants. Lectures, recitations, and laboratory work.
This course must be preceded by Course 1.
Students who transfer their credits to the College of Engineering

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will be required to offer Courses 2 and 2*a* as an equivalent of 2E.

All elections, including those of upper classmen, must be made through the Classification Committee.

2*a*. Problem Course. *One hour credit.* Assistant Professor SLEATOR.

2*b*. Laboratory Work in Magnetism, Electricity, and Light. *One hour credit.*

B. For Graduates and Undergraduates.

6. Electrical Measurements. Lectures, recitations and laboratory. *Four hours credit.* Professor SMITH.

This is a continuation of Course 5, and includes measurements of capacity, self and mutual inductance, and the fundamental measurements, with alternating currents. Especial attention is given to the theory of the magnetic circuit and the determination of the magnetism and hysteresis curves of iron and steel.

A working knowledge of the calculus is required.

8. Advanced Physics. *Four hours credit.* Continuation of Course 7. Assistant Professor LINDSAY.

Courses 1 and 2 are prerequisites of this course, and a knowledge of calculus is required. Course 8 naturally follows Course 7, but may precede it.

10. Alternating Currents. *Two hours credit.* Professor WILLIAMS.

12. Laboratory Work in Light. *Two hours credit.* Laboratory work. Dr. MEYER.

This course includes work with the prism and grating spectrometers, refractometer, and Pulfrich and Michelson interferometers. Experiments are performed by the student in diffraction, resolving power, and double refraction. Some elementary spectroscopic work is done.

14. Electron Theory and Radioactivity. *Two hours credit.* Lectures, laboratory. Professor SMITH.

The laboratory work deals largely with radioactive substances. The distinguishing characteristics of alpha rays, beta rays, and gamma rays are studied, and the half-life periods of several substances are determined by each student.

16. Electrochemical Physics. *Two hours credit.* Professor HENDERSON.

This course must be preceded by Course 15, or an equivalent course in Electrochemistry.

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18. Measurements of High Temperatures. *Two hours credit.* Dr. KENT.

An experimental course accompanied by lectures, covering the present methods of high temperature measurement. Opportunity is offered to use the gas thermometer, resistance thermometer, and various types of thermo-electric and radiation pyrometers.

20. Architectural Acoustics. *Two hours credit.* Assistant Professor RICH.

A lecture course on the causes underlying good and bad acoustical conditions in auditoriums, with illustrative problems on sound transmission, distribution, and absorption. This course is designed primarily for architects, but is also open to other students.

C. Courses Primarily for Graduates.

22. Theoretical Mechanics. Continuation of Course 21. Professor FIELD.

24. The Theory of Light. A theoretical course in which selected chapters of the subject are considered. *Two hours credit.* Dr. MEYER.

26*a*. Radiation, II. *Two hours.* Professor RANDALL.

A lecture course dealing principally with series relations in spectra; the Zeeman and Stark effects; theories of atomic structure and allied topics. Continuation of Course 26. Given in 1920-1921 and alternate years.

28. Electricity and Magnetism. Continuation of Course 27. *Three hours credit.* Professor COLBY.

30. Special Problems.

32. Thermodynamics and Gas Theory. *Two hours credit.* Continuation of Course 31. Professor COLBY.

38. French Reading. *One hour credit.* Assistant Professor LEE.

This course is of the same nature as the one in German reading (37) given during the first semester.

42. Seminary. *Two hours credit.*

46. Colloquium.

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SUMMER SESSION OF 1921

For Undergraduates.

Z. Physics for Entrance. Dr. LINDSAY.

1. General Physics. Mechanics, Sound, and Heat. *Four hours credit.* Professor WILLIAMS, Dr. KENT, Dr. FAZEL, Mr. BECKER, and Mr. BABBITT.

2. General Physics. Magnetism, Electricity, and Light. *Four hours credit.* Assistant Professor RICH, Dr. SHELDON, Mr. ST. PETER, and Mr. CORK.

1*a*. Problems. *One hour credit.* Assistant Professor SLEATOR.

2*a*. Problems. *One hour credit.* Assistant Professor SLEATOR.

1E. General Physics. *Five hours credit.* Professor WILLIAMS, Dr. KENT, Dr. FAZEL, Mr. BECKER, and Mr. BABBITT.

2E. General Physics. *Five hours credit.* Assistant Professor RICH, Dr. SHELDON, Mr. ST. PETER, and Mr. CORK.

1D. General Physics. Mechanics, Sound, and Heat. *Four hours credit.* Professor WILLIAMS, Dr. KENT, Dr. FAZEL, Mr. BECKER, and Mr. BABBITT.

2D. General Physics. Magnetism, Electricity, and Light. *Four hours credit.* Professor RICH, Dr. SHELDON, Mr. ST. PETER, and Mr. CORK.

1*b*. Laboratory Work in Mechanics, Sound, and Heat. *One hour credit.* Mr. ST. PETER.

2*b*. Laboratory Work in Magnetism, Electricity, and Light. *One hour credit.* Mr. ST. PETER.

3. Teachers' Course. *Two hours credit.* Assistant Professor RICH.

5. Electrical Measurements. *Four hours credit.* Professor SMITH, and Dr. SAWYER.

For Graduates and Undergraduates.

6. Electrical Measurements. *Four hours credit.* Professor SMITH, and Dr. SAWYER.

7*a*. Advanced Physics. Mechanics. *Two hours credit.* Assistant Professor LINDSAY.

8. Advanced Physics. Magnetism, Electricity, and Light. *Four hours credit.* Assistant Professor LINDSAY.

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8*a*. Advanced Physics. Light. *Two hours credit.* Assistant Professor LINDSAY.

8*b*. Advanced Physics. Electricity and Magnetism. *Two hours credit.* Assistant Professor LINDSAY.

11. Laboratory Work in Heat. *Two hours credit.* Dr. KENT.

14. Electron Theory and Radioactivity. *Two hours credit.* Professor SMITH.

17. Sound. *Four hours credit.* Assistant Professor SLEATOR.

18. Measurements of High Temperatures. *Two hours credit.* Dr. KENT.

For Graduates.

24. Theory of Light. *Two hours credit.* Assistant Professor LINDSAY.

25. Theory of Heat. *Two hours credit.* Professor RANDALL.

26. Radiation, I. *Two hours credit.* Professor RANDALL.

29. Advanced Laboratory Work. *Two hours credit.* Assistant Professor SLEATOR, and Dr. KENT.

33. Vacuum Tubes in Radio Communication. *Two hours credit.* Professor WILLIAMS.

38. Research. *Credit to be arranged.* Professor RANDALL.

Physiological Chemistry

(See Medical Sciences)

Physiology

(See Medical Sciences)

Political Economy

(See Economics)

POLITICAL SCIENCE

(GROUP III.)

The courses in Political Science cover elementary as well as advanced and specialized study of the entire field. A list of all courses presented in this department is given below. Some of these are not given every year. This list is so arranged as to indicate the subordinate fields of study within the scope of Politics. It is followed

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by a description of such courses as are offered during the year for which this Announcement appears.

Courses 1 and 2 are prerequisites for all other courses in Political Science.

CONSULTATION HOURS.—Throughout registration week, September 20 to 24, a departmental representative, daily, 10-12. Room 108, Ec.

SUMMARY OF ALL COURSES OFFERED IN THIS DEPARTMENT

INTRODUCTORY AND GENERAL COURSES

FIRST SEMESTER	SECOND SEMESTER
1. American Government.	2. American Government.
15. World Politics.	16. National Politics.
31. Introduction to Law.	22. Principles of Politics.
13. Seminar and Journal Club in Political Science.	14. Seminar and Journal Club in Political Science.

GOVERNMENT

7. British Government.	8. European Governments.
9. Colonial Government.	10. U. S. Constitutional Law.
3. Municipal Government.	4. Municipal Government.
17. Municipal Administration.	18. Municipal Administration.
	12. Municipal Finance.
19. Comparative Government.	20. Comparative Government.
	30. State Government.
13*a*. Seminar.	14*a*. Seminar.

INTERNATIONAL LAW AND DIPLOMACY

5. International Law.	6. International Law.
27. American Diplomacy.	28. European Diplomacy.
29. Diplomatic and Consular Methods.	
13*b*. Seminar.	14*b*. Seminar.

COMPARATIVE LAW

31. Introduction to Law.	
33. Roman Law.	34. Roman Law.
35. Comparative Jurisprudence.	36. Principles of Public Law.
37. Primitive Law.	38. Modern Legal Theory.
13*c*. Seminar.	14*c*. Seminar

POLITICAL THEORY

21. Political Origins.	22. Principles of Politics.
23. Political Theory: Ancient and Mediaeval.	24. Political Theory: Modern.
25. Political Theory: Nineteenth Century.	26. Political Theory: Twentieth Century.
13*d*. Seminar.	14*d*. Seminar.

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COURSES OFFERED IN 1920-1921

FIRST SEMESTER

I. Primarily for Undergraduates.

1. American Government. Lectures, readings, recitations, and reports. *Three hours credit.* Professors REEVES and HAYDEN, and Dr. KIRKPATRICK.

This is a course designed primarily for undergraduates as a preparation for citizenship. It is conducted by means of lectures and recitations with supplementary readings extending throughout the year. It is expected that all students electing other courses in Political Science shall have had this course or its equivalent. The first semester is devoted to a study of National Government and Administration. In the second semester the work is divided between the study of State Governments and Administration and that of the American Party System. Throughout the course attention is centered rather upon the actual workings of government than upon the more mechanical side of administration.

II. For Graduates and Undergraduates.

3. Municipal Government. Lectures, recitations, and reports. *Three hours credit.* Professor CRANE.

The commission and manager forms of city government are studied in the first semester along with other questions of the sociological, political, and legal character, organization, and frame-work of the municipality. The second semester is devoted to the activities of these governments,—city planning, police, social welfare, public improvements, utilities, finance, and other functions. While in part historical and comparative, the courses deal mainly with American cities of the present time. The method of instruction is by lectures, text, and quiz. Outside readings or special reports may be assigned at discretion.

5. Public International Law. Lectures, recitations, and discussion. *Three hours credit.* Professor REEVES.

The work in international law is conducted principally by means of classroom discussion. The intention is not so much to drill in dogmatic statements of the law as to develop in the student the ability to analyze international situations for himself with some degree of clearness. The work comprises a general view of the elementary principles of the subject by text-book and informal lectures, the investigation and discussion of international incidents, and the consideration of the leading cases in international law, British and American.

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7. British Government and Administration. Text, collateral readings, and discussion, supplemented by lectures. *Three hours credit.* Professor HAYDEN.

In this course attention will be centered on those features of modern British government which have justified the large influence it has exercised upon governments both in America and in Europe. Parliament, its sovereignty, structure, and working, the Cabinet and responsible government, the Crown and functions of the executive, the judiciary and the English conception of law, and the problems connected with the growth of the Empire, are the topics of prime consideration.

15. World Politics. Lectures, collateral reading, and reports. *Two hours credit.* Professor CRANE.

This course presents a general discussion from a non-technical point of view of the political problems, national and international, of the present day. The proper solution of these questions depends upon the development of sound public opinion. The obligation of the college man and woman in the formation of that opinion is manifest.

The aim of this course is to collect the scattered elements of the always confusing situation of the moment and to try to grasp them as one connected whole. Attention will first be directed to the general political tendencies of the period immediately preceding the Great War and then to the effect of the War upon their future development.

By special permission, a third hour may be elected, with credit for quiz and discussion.

17. Municipal Administration. Lectures, discussion, and reports. *Two hours credit.* Dr. UPSON.

This is an advanced course dealing with the practical methods by which the purposes of municipal governments are accomplished. Attention is centered upon the character of municipal functions and the machinery by which they are made effective. The student will be given such advantages of field training as can be secured from discussion of field problems, a first-hand acquaintance with field organization and a very limited amount of field work. It is preferable to take this work after or in conjunction with the courses in Municipal Government, Political Science 3 and 4.

21. Political Origins. Texts, collateral readings, and discussions, supplemented by lectures. *Two hours credit.* Dr. KIRKPATRICK.

A consideration of the contributions which anthropology and sociology make to political science. Brief notice will be taken of man's origin, racial characteristics, and distribution. More time will be given to the study of the beliefs and practices of primitive peoples, and of their family and group life as they advance toward modern society and the state.

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29. Diplomatic and Consular Methods. *Two hours credit.* Professor CRANE.

Beginning with a historical survey of the development of the diplomatic and consular functions in the United States, this course will treat of the organization and administration of the American foreign service and the activities of American diplomatic and consular officers.

III. For Graduates.

13. Seminary and Journal Club in Political Science. *Two hours credit.* Professor REEVES and members of the department of Political Science.

Reports of original work by faculty and students, discussion of current questions of government, administration, international and constitutional law, and examination of recent scientific literature. Each student will be assigned work in any part of the field of politics in which he may have a particular interest. The seminary will thus cover the entire scope of Politics, and whenever desirable it will be conducted in sections devoted to Government, International Law and Diplomacy, Comparative Law, and Political Theory.

19. Comparative Government. *Two hours credit.* Professor HAYDEN.

This course is primarily for graduate students, but is open to others by permission. Intensive study will be given to selected political institutions of our own and foreign governments. Subjects such as the relation of upper and lower legislative chambers, national budget making, legislative control of national finances, legislative procedure, electoral laws, the relations of the executive and the legislative branches of government, local and central government will be investigated, the choice of topics being made by the instructor and the students. Students wishing to elect this course should consult with Professor HAYDEN.

23. Political Theory: Ancient and Mediaeval. Readings and discussion. *Two hours credit.* Professor CRANE.

The historical development of political theories is studied in four consecutive semesters, covering two years' work, Courses 23, 24, 25, and 26.

After a survey of the period under consideration, an exhaustive examination will be undertaken of some small portion of it. The purpose is to give thorough grounding in the fundamental principles, and at the same time to give training in the methodology, of politics. Open only to candidates for the doctor's degree. The hours are subject to change.

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SECOND SEMESTER

I. Primarily for Undergraduates.

2. American Government. Lectures, readings, recitations, and reports. *Three hours credit.* Professor REEVES and HAYDEN, and Dr. KIRKPATRICK.
It is expected that those who have successfully pursued Course 1 will follow with Course 2. Course 1 is a prerequisite to Course 2.

II. For Graduates and Undergraduates.

4. Municipal Government. *Three hours credit.* Professor CRANE.
This is a continuation of Course 3 and deals with the actual functions of city government rather than with its organization. Either of these courses may be taken independently of the other.

6. Public International Law. Cases, assigned readings, discussion, and reports. *Three hours credit.* Professor REEVES.
A continuation of Course 5, which is a prerequisite.

8. Continental European Governments. *Three hours credit.* Professor HAYDEN.
In this course attention is directed mainly to the governments of France, Italy, Switzerland, and Germany. Particular consideration will be given to the political ideals of the various nations as exemplified in their institutions and practice. Structural reorganization of the European governments, old and new, will receive special treatment.

12. Administration of Municipal Finance. Lectures, readings, and reports. *Two hours credit.* Mr. STEFFENS.
This course will deal from the standpoint of the administrator with the problems of finance in the precise form in which they confront our city authorities. The work will cover the budget and budget methods, the sources and collection of revenues, assessment, custody of money, appropriations and their proper objects, loans, sinking funds and serial bonds, purchasing, and audit.

16. National Politics. Lectures, collateral readings, and reports. *Two hours credit.* Professor HAYDEN.
This course presents a study of the more important current issues of national politics in the United States, and is given from the standpoint of the citizen who wishes a basis for rational opinion upon them. National defense, foreign relations, Latin-American affairs, the colonial policy of the United States, including the Philippine and Porto Rican problems, a national

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budget, government ownership, the tariff, the organization of political parties, prohibition, the relation of the government to capital and labor, the vital problems arising out of reconstruction and the existing industrial unrest, and other questions will be considered. The positions of the great political parties on these questions will be studied, and reference will be made to the experiences of other countries in connection with them.

18. Municipal Administration. *Two hours credit.* Dr. UPSON.
A continuation of Course 14. It may be taken before or after that course or alone; but preferably after or in conjunction with the course in Municipal Government, Political Science 3 and 4.

22. Principles of Politics. Texts, lectures, readings, and quiz. *Three hours credit.* Professor CRANE.
The purpose of this course is to clarify political terms in common use and to give the student a sounder conception of the theoretical principles by which actual politics are so profoundly governed. A brief treatment of the development of political institutions, concluding in a rapid analysis of some of the great governments of the world today, is followed by a study of the history of some of the most important political ideas from Greek times to our own. In the light of these principles, various fundamental views of political authority are discussed, such as the socialistic and the anarchistic doctrines.

III. For Graduates.

14. Seminary and Journal Club in Political Science. *Two hours credit.* Members of the department of Political Science.
This course is of the same nature and conducted in the same manner as Course 13. These courses are not repeated, the subject matter being always new. They may be taken consecutively, or either may be taken separately. Candidates for the degree of doctor of philosophy in Political Science are expected to continue the seminary during residence.

20. Comparative Government. *Two hours credit.* Professor HAYDEN.
This course is conducted in the same manner as Course 19, of which it is a continuation. It may, however, be elected independently, as the subjects chosen for investigation vary with each semester. Students wishing to elect this course should consult with Professor HAYDEN.

24. Political Theory: Modern. Readings and discussion. *Two hours credit.* Professor CRANE.
This course deals with the development of political theory from Machiavelli through the Eighteenth Century. It properly fol-

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lows Course 23, but may be taken independently of that course. After a survey of the period under consideration, an exhaustive examination will be undertaken of some small portion of it. The purpose is to give thorough grounding in the fundamental principles, and at the same time to give training in the methodology, of politics. Open only to candidates for the doctor's degree.

30. Problems in State Government. Lectures, readings, and reports on assigned topics. *Two hours credit.* Dr. KIRKPATRICK.
A study of recent state constitutional development and of tendencies in the organization and practice of state administration. Michigan will be used as a standard of comparison.

SUMMER SESSION OF 1921

1*a*. American Government. *Two hours credit.* Professor REEVES.

3*a*. Municipal Government. *Two hours credit.* Professor CRANE.

5*a*. Public International Law. *Two hours credit.* Professor REEVES.

22*a*. Principles of Politics. *Two hours credit.* Professor CRANE.

Psychology

(See Philosophy and Psychology)

PUBLIC SPEAKING

Students who desire practice in public speaking in addition to that offered in the classroom are advised to join a literary society and take part in the debates and oratorical contests provided by the Oratorical Association. For information regarding the contests of the Northern Oratorical League, the Central Debating League, and the Midwest Debating League, and the medals and testimonials offered, see page 87, or consult the instructors of this department.

Students who wish to acquire exceptional proficiency in public speaking should begin class work early in their college course.

Those preparing to teach Public Speaking should take at least twenty hours of work in the department selected after consultation with the professors in charge. Only those who show marked ability in expressive reading and in public speaking will be encouraged to prepare for teaching.

CONSULTATION HOURS.—Consultation hours will be posted on the bulletin board in Room 302, M. H.

During registration week, September 20 to 24, Professor TRUEBLOOD, Professor HOLLISTER, or Assistant Professor IMMEL, 10 to 12. Room 302, M. H.

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FIRST SEMESTER

1. Principles of Expression. *Three hours credit.* Assistant Professor IMMEL, Mr. WILNER, Mr. HATHAWAY, and Mr. BRANDT.
This course consists in (1) a study of the theory of expression by voice and action, (2) exercises of developing the voice and improving the stage presence, (3) practice in reading and speaking. The course seeks to give the student the fundamental principles necessary to self-criticism, and an opportunity to apply these principles in practice. Orations are studied, memorized, and interpreted from the platform, and short original speeches are given, with special reference to distinct, direct, interesting speaking. Students with previous training may, by special permission, omit Course 1.

2. Extempore Speaking. *Two hours credit.* Assistant Professor IMMEL, Mr. WILNER, Mr. HATHAWAY, and Mr. BRANDT.
Studies in public speaking and the delivery of short original speeches for special occasions. Emphasis is laid on the preparation of a thorough brief for each speech. Speeches are given from the platform without the use of notes. This course aims to give as much practice in self-expression as possible.
Course 2 must be preceded by Course 1 or its equivalent.

3. Study of Great Orators. *Three hours credit.* Professor TRUEBLOOD.
Lectures on methods of public address and sources of power. Study of representative orations. Structure of the oration. Qualities of a good oration. The preparation and delivery of speeches. Those who desire at some time to enter the oratorical contests should take this course. Orations prepared for University contests will be accepted as a part of the work.
Course 3 must be preceded by Courses 1 and 2 or their equivalent.

5. Debating. *Three hours credit.* Professor TRUEBLOOD.
Study and application of the principles of argumentation. Preparation of briefs. Leading questions of the day studied and debated in class. Students take part in six debates. The aim is to develop readiness in extempore speaking, to give freedom and ease on the platform, and to cultivate the logical processes of analysis and discrimination. All who expect to enter the debating contests or who expect to teach argumentation should take this course.
Course 5 must be preceded by Courses 1 and 2 or their equivalent.

6. Story Telling. *Two hours credit.* Assistant Professor IMMEL.
A study of literature for children, with practice in story telling before the class and before audiences of children. Intended

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for those especially interested in library work, playground supervision, and primary teaching.

Course 6 must be preceded by Course 1 or its equivalent, and may be elected only by special permission of the instructor.

[7. Shakespearean Reading. *Three hours credit.* Professors TRUEBLOOD and HOLLISTER.

Critical study of two plays, a tragedy and a comedy. Analysis of character, plot, and incident. Expressional reading of principal scenes. Characters assigned to members of the class and scenes presented from the platform. Public presentation of plays twice each semester. Plays selected from the following: *Julius Caesar, Othello, The Merchant of Venice, Romeo and Juliet, The Tempest.*

Course 7 must be preceded by Course 1 or its equivalent.

Omitted in 1920-1921.]

7*a*. Shakespearean Reading. *Three hours credit.* Continuation of Course 7. Professors TRUEBLOOD and HOLLISTER.

Plays to be selected from the following: *Coriolanus, King John, Henry VII, Anthony and Cleopatra, The Comedy of Errors, The Taming of the Shrew, Measure for Measure.*

Course 7*a* must be preceded by Course 1 or its equivalent.

9. Interpretative Reading. *Two hours credit.* Professor HOLLISTER.

This course involves a study in the appreciation and oral interpretation of masterpieces of literature. Special effort is made first, to understand and feel; second, to express for others. Selections drawn from miscellaneous sources are read aloud in class and delivered from the platform. The course is designed not only to develop good reading for purposes of culture and public entertainment, but especially for those who expect to teach English Literature.

14. Play Production. *Two hours credit.* Professor HOLLISTER.

A study of plays suitable for stage presentation, and of the problems involved in producing such plays. One or more plays will be presented in costume. Open only to advanced students who receive permission from the instructor. Not to be elected in connection with Course 7*a*.

[15. Theory of Expression. *Two hours credit.* Professor HOLLISTER.

An investigation of one or more problems in oral expression. Lectures, assigned readings, discussions, experiments. Each members of the class assigned a topic for investigation, report, and thesis. Open only to seniors and graduates who receive permission. Special attention will be given to problems of vocalization and speech betterment. Omitted in 1920-1921.]

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SECOND SEMESTER

1. Principles of Expression. *Three hours credit.* Assistant Professor IMMEL, Mr. WILNER, Mr. HATHAWAY, and Mr. BRANDT.
This is the same as Course 1, given in the first semester.

1*b*. Speech Correction. Assistant Professor HOLLISTER.
A practical laboratory course in vocalization. Open to students who wish to correct their own vocal defects and weaknesses.

2. Extempore Speaking. *Two hours credit.* Assistant Professor IMMEL, Mr. WILNER, Mr. HATHAWAY, and Mr. BRANDT.
This is the same as Course 2, given in the first semester.
Course 2 must be preceded by Course 1 or its equivalent.

3. Study of Great Orators. *Three hours credit.* Professor TRUEBLOOD.
This is the same as Course 3, given the first semester.
Students who desire to enter the oratorical contests of the following year are advised to take this course and prepare their orations.
Course 3 must be preceded by Courses 1 and 2 or their equivalent.

[4. Shakespearean Reading. *Two hours credit.* Professor TRUEBLOOD, and Mr. WILNER.
Oral reading of two plays, a tragedy and a comedy. Characters assigned to members of the class and plays presented from the platform. Public presentation of plays twice each semester. The aim is to stimulate interest in Shakespeare by vocal interpretation and dramatic presentation. Plays selected from the following: *Macbeth, Richard III, Much Ado About Nothing, Henry IV* (Part I), *The Winter's Tale, A Midsummer Night's Dream.*
Course 4 must be preceded by Course 1 or its equivalent.
Omitted in 1920-1921.]

4*a*. Shakespearean Reading. Continuation of Course 4. *Two hours credit.* Professor TRUEBLOOD, and Mr. WILNER.
Plays to be selected from the following: *Hamlet, King Lear, Henry V, As You Like It, Twelfth Night, Cymbeline.*
Course 4*a* must be preceded by Course 1 or its equivalent.

5. Debating. *Three hours credit.* Professor TRUEBLOOD.
This is the same as Course 5, given in the first semester.
Course 5 must be preceded by Courses 1 and 2.

6. Story Telling. *Two hours credit.* Assistant Professor IMMEL.
This is the same as Course 6, given in the first semester.

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10. Advanced Public Speaking. *Three hours credit.* Professor TRUEBLOOD.
Examination of the Webster-Hayne, the Lincoln-Douglas, and other great debates. Study of famous platform addresses. Preparation and delivery by each student of an extended address. Participation in a public debating or oratorical contest during the semester, or the presentation of an equivalent amount of practical speaking before public assemblies is required.
Open to students who have shown exceptional proficiency in speaking and reading. The class is limited to sixteen persons.
Course 10 must be preceded by Courses 1, 2, and 3 or 5.

[11. Oral Interpretation of Tennyson. *Two hours credit.* Professor HOLLISTER.
Open to students who have had Course 1 or its equivalent.
Omitted in 1920-1921.]

11*a*. Oral Interpretation of Browning. *Two hours credit.* Professor HOLLISTER.
Open to students who have had Course 1 or its equivalent.

13. Oral English. *Two hours credit.* Professor HOLLISTER.
A study of the aims, problems, and methods of oral English teaching. Open to advanced students and graduates who expect to teach English or Public Speaking or who are interested in the educational aspects of English study.

14*a*. Play Production. *Two hours credit.* Professor HOLLISTER.
This is similar to Course 14, given during the first semester.
Open only to advanced students who receive permission. Not to be elected with Course 4 or 4*a*.

SUMMER SESSION OF 1921

1*a*. Principles of Expression. *Two hours credit.* Assistant Professor IMMEL, and Mr. WILNER.

2. Extempore Speaking. *Two hours credit.* Mr. WILNER.

7*b*. Shakespearean Reading. *Two hours credit.* Mr. WILNER, and Assistant.

5*a*. Debating. *Two hours credit.* Assistant Professor IMMEL.

9*a*. Interpretive Reading. *Two hours credit.* Assistant Professor IMMEL.

13*a*. Speech Problems. *Two hours credit.* Professor HOLLISTER.

14*b*. Play Production. *Two hours credit.* Professor HOLLISTER, and Assistant.

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RHETORIC

(GROUP I; EXCEPTING COURSES 1 AND 2.

Courses 1 and 2 are required of all first-year students, and must precede all other courses.

The courses offered in this department are of three principal kinds: (1) Courses intended primarily to give the student practice in the leading types of prose composition, including Courses 1, 2, 3, 4, 15, 18, and 20. (2) Courses intended primarily to familiarize the student with the fundamental principles of Rhetoric and Criticism, including Courses 5, 7, 8, 9, 10, 12, 16, 17, and 19. (Courses 7, 8, 12, 23, and 24 combine advanced composition with the study of rhetorical and critical theory.) (3) Courses for students who are preparing for newspaper work. A special circular regarding these courses may be obtained upon application to the Secretary of the University.

Courses 1 and 2 are introductory. They aim to promote clearness and correctness of expression through practice in the simpler kinds of composition. Courses 3 and 4, providing systematic practice in the four principal types of prose composition, are intended to follow Course 2, and are usually taken in the second year. Courses 5, 12, 15, 16, 18, and 20, being still more advanced, belong naturally in the third year. In Courses 7 and 8 it is assumed that the student has already acquired considerable proficiency in composition and is prepared to give attention chiefly to the discussion of principles. Courses 23 and 24 are for those who show exceptional ability in writing or who aim to follow literary composition as a profession. Courses 9, 9*a*, 10, and 10*a* are for students who are working for the higher degrees.

The advanced and graduate courses presuppose an acquaintance with the fundamental principles of rhetoric and a reasonable proficiency in the technic of prose. Composition, except where it is pursued with reference to the theory of teaching, is regarded as an undergraduate study.

Students in the Combined Literary and Law Curriculum should elect Courses 1, 2, 3, and 4, though Course 15 may with permission of the instructor be substituted for Course 3 or Course 4.

From September 20 to 24, inclusive, an instructor will be in Room 201, W. H., from 10 to 12 daily, to assist students in making their elections.

FIRST SEMESTER

1. Composition and Rhetoric. *Three hours credit.* Mr. EVERETT, Dr. GRIM, Dr. WIER, Mr. CONKEY, Mr. PETERSON, Dr. SCOTT, Mr. WALTER, Mr. WRIGHT, Mr. HALL, Mr. SCHENCK, Mr. LASHER, Mr. WICKER, Mr. MITCHELL, Mr. CROCKER, Mr. JOHNSON, Mr. ADAMS, Mr. SCHMIEDESKAMP, Mr. QUINNELL, Mr. BOUCHARD, Mr. KUHN, Mr. ABBOT.

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2. Continuation of Course 1. *Three hours credit.* Mr. JOHNSON.
This course is the same as Course 2, given in the second semester. It is open only to students who have already completed Course 1, or have received credit for it. Students who need three hours to complete the requirement in Rhetoric for graduation are expected to take Course 2 in the first semester, as the sections announced for the second semester are not open to such students.

3. Advanced Composition and Rhetoric. Essays in description and narrative. *Three hours credit.* Professor RANKIN, Assistant Professors MALLORY and COWDEN, Dr. GRIM, Dr. SCOTT, and Mr. PETERSON.

7. Interpretations of Literature and Art. *Two hours credit.* Professor SCOTT.
The course begins with a discussion of critical principles. Later these principles are applied in the appreciation and interpretation of specimens of literature and art. Open only to senior and graduate students who have permission. The course is conducted as a seminary.

9. Seminary in Rhetoric and Criticism. *Two hours credit.* Professor SCOTT.
The subjects of discussion vary from year to year. Among the problems to be investigated are the following: the origins of prose; the nature and origin of the leading types of discourse; the sociological basis of the principles of usage; the origin, development, and laws of the process of communication; prose rhythm.
Open only to graduate students.

9*a*. Special Problems in Rhetoric and Criticism. *Two hours credit.* Professor SCOTT.
Limited to students who are working for the doctor's degree.

[15. The Theory and Practice of Argumentation. *Three hours credit.* Professor BRUMM.
A study of the principles which underlie argument. Special attention will be paid to the brief and to the relative value or various forms of proof. This course is intended for those who desire special training in argumentation. Open to students who have had Courses 1, 2, 3, and 4, and others who receive special permission. Omitted in 1920-1921.]

17. Diction and Usage. *Three hours credit.* Assistant Professor COWDEN.
The work of this course is intended to accomplish two results: (1) the establishment of a method of dealing with problems

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in diction and usage; (2) the development of the student's sense for the right use of word, phrase, and idiom. Under the first heading various questionable expressions will be discussed with a view to determining their standing as parts of the English language. Under the second heading passages from standard prose and verse will be examined with a view to discovering whether each word or phrase used is the one best adapted to the author's purpose.

19. Studies in the Drama. *Three hours credit.* Professor RANKIN. Lectures and study of modern plays. Special attention will be given to comparison of the methods of present-day play-writing with those of earlier times, in order to determine what are the permanent elements of dramatic technique.
Open only to seniors and graduate students.

23. Seminary in Advanced Composition. *Two hours credit.* Professor SCOTT.
This course is intended for a limited number of advanced students who, writing with facility and being in the habit of writing, desire personal criticism and direction. No work is assigned and no set program is followed, but each student is expected in the course of the semester to submit for revision a considerable number of manuscripts. In connection with the class discussions, there will be talks upon the essentials of English composition and the principles of criticism and revision. Open only to seniors who receive special permission.

Courses in Journalism

The courses in Journalism are open only to juniors and seniors or such other students as have completed Courses 1, 2, and 3 or 4 in rhetoric. The work is designed for students who are following the announced curricula in Journalism.

In the following courses the instruction will be supplemented, when possible, by special lectures given by experienced newspaper workers.

31. Newspaper Organization and Practice. Lectures, discussions, and written exercises. *Three hours credit.* Professor BRUMM.
A study of the nature and function of the public press, with practice in reporting, interviewing, rewriting, and copy editing, including the writing of headlines. Particular stress will be laid upon the distinction between genuine news values and merely sensational appeals.

33. Editorial Writing. Lectures, discussions, and written exercises. *Three hours credit.* Professor BRUMM.
A critical study of the editorial. The aim of this course will be

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to determine the proper function of editorial writing, especially in its relation to the shaping of public opinion. Written assignments will include the selection of topics for editorial comment, the use of reference books, and the preparation of the expository and argumentative types of editorial articles.

35. Seminary in Newspaper Problems. *Two hours credit.* Professor BRUMM.
This course will deal with newspaper problems and with special phases of editorial routine. Newspaper policy and responsibility will receive particular attention, together with an analysis of the relation of journalism to literature.

SECOND SEMESTER

1. Same as Course 1, given in the first semester. *Three hours credit.* Mr. JOHNSON.
Open only to students who enter at the beginning of the second semester, or who have failed to receive credit in Course 1 the first semester.

2. Composition and Rhetoric. *Three hours credit.*
Continuation of Course 1. The hours and instructors are the same as those announced under Course 1, the first semester. Students cannot change from one section to another at the beginning of the second semester without obtaining special permission.

4. Advanced Composition and Rhetoric. Essays in Exposition and Argument. *Three hours credit.* Professor RANKIN, Assistant Professors MALLORY and COWDEN, Dr. WIER, Dr. GRIM, Dr. SCOTT, and Mr. PETERSON.

5. Rhetorical Analysis. *Two hours credit.* Professor RANKIN.
Special attention will be given to the minute analysis of structure.
Open to juniors and seniors.

8. Prose Fiction. *Two hours credit.* Professor SCOTT.
Studies in the structure and function of the leading types of prose fiction, including the short story.
Open only to senior and graduate students who have permission. The course is conducted as a seminary.

10. Seminary in Rhetoric and Criticism. *Two hours credit.* Professor SCOTT.
Continuation of Course 9. Open only to graduate students.

10*a*. Special Problems in Rhetoric and Criticism. *Two hours credit.* Professor SCOTT.
Limited to students who are working for the doctor's degree.

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12. Book Reviews. *Three hours credit.* Assistant Professor MALLORY.
A study of critical principles, followed by discussions of selected works of contemporary literature.

16. Modern English Prose. *Two hours credit.* Professor COWDEN.
A study of the development of English prose style as exemplified in the writings of Sidney, Lyly, Bacon, Milton, Bunyan, Dryden, Defoe, Swift, Steele, Addison, Johnson, Lamb, De Quincey, Carlyle, Macaulay, Emerson, Hawthorne, Ruskin, Arnold, Pater, and Stevenson. Written reports and classroom discussions.
Open only to juniors and seniors.

18. Junior Composition. *Two hours credit.* Assistant Professor COWDEN.
A course intended to give training in the writing and revision of compositions. The student will be expected to submit five or six manuscripts during the semester.
Open only to juniors who have had Rhetoric 3 or 4, and limited to twenty students. All those wishing to take this course should consult with the instructor before making their election.

20. Short Story Writing. *Two hours credit.* Professor RANKIN.
Analytic studies in the technique of the short story will be accompanied by constructive work in story writing.
Open only to juniors and seniors who have had Course 3.

24. Seminary in Advanced Composition. *Two hours credit.* Professor SCOTT.
Continuation of Course 23. Open only to students who receive special permission.

Courses in Journalism

32. Newspaper Feature Writing. *Three hours credit.* Professor BRUMM.
Special attention will be given in this course to feature stories and special articles, with practice in copy editing.

34. Written Criticism. *Three hours credit.* Professor BRUMM.
A study of critical principles in their application to literature, painting, music, and the drama, including the photoplay.

36. Seminary in Editorial Practice. *Two hours credit.* Professor BRUMM.
A study of editorial methods as exemplified in the leading metropolitan papers. An attempt will be made to distinguish the elements that characterize the best professional journalism.

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38. Advertisement Writing. *Two hours credit.* Professor BRUMM. This course is intended for students who are preparing to take up advertising as a profession. It will include (1) practice in all of the more important types of advertising publicity, and (2) lectures by advertising experts. Open only to seniors. A course in the Psychology of Advertising is offered in the department of Philosophy and Psychology (Course 25).

SUMMER SESSION OF 1921

1 and 2. First Year Rhetoric. *Three or six hours credit.* Dr. H. P. SCOTT, and Mr. EVERETT.

3*a*. Narrative Writing. *Two hours credit.* Assistant Professor MALLORY.

12*a*. Book Reviews. *Two hours credit.* Assistant Professor MALLORY.

16*a*. Modern English Prose. *Two hours prose.* Assistant Professor COWDEN.

17*a*. Diction and Usage. *Two hours credit.* Assistant Professor COWDEN.

27. Description. *Two hours credit.* Assistant Professor COWDEN.

19*a*. Studies in the Drama. *Two hours credit.* Professor RANKIN.

20. Short-story Writing. *Two hours credit.* Professor RANKIN.

30. Studies in Rhetorical Theory. *Two hours credit.* Professor RANKIN.

31*a*. Newspaper Organization and Practice. *Two hours credit.* Professor BRUMM.

3*a*. Written Criticism. *Two hours credit.* Professor BRUMM.

ROMANCE LANGUAGES AND LITERATURES

(GROUP I.)

French

Students especially interested in language study are advised to elect two foreign languages in the freshman year. Two new languages, however, should not be begun at the same time. See page 155.

Courses 1, 2, 3, 4, must precede all others. Students in these courses are expected to remain in the same section throughout the year, and should choose their section accordingly. Students intending to enter upon the study of French at any point of their course will find it greatly to their advantage to do so in their first year.

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Students who have had one year of French in preparation for the University should elect Course 2; those who have had three years should elect Course 4.

Students desiring to become teachers of French should consult Professor CANFIELD as soon as possible. Only students who have marked linguistic ability are encouraged to prepare themselves for teaching, and no student who has not been more than ordinarily successful in his work in the department, and acquired more than an average proficiency, will be recommended.

Members of the staff may be consulted concerning the arrangement of their work, from September 20 to 24, inclusive, as follows:

Professor CANFIELD, from 9 to 12, in Room 104, S. W.
Professor LEVI, from 10 to 12, in Room 200, S. W.
Professor EFFINGER, in the Dean's office.
Professor THIEME, from 10 to 12, in Room 300, S. W.
Professor WAGNER, from 10 to 12, in Room 203, S. W.
Assistant Professor TALAMON, from 10 to 12, in Room 300, S. W.
Assistant Professor MCLAUGHLIN, from 10 to 12, in Room 104, S. W.

FIRST SEMESTER

Primarily for Undergraduates.

1. Elementary Course. Grammar and easy reading, with practice in speaking. *Four hours credit.* Mr. EDDY, Mr. DE FILIPPIS, Mr. HACKES, Mr. HOOTKINS, Dr. LEARNED, Mr. MUYSKENS, and Mr. PURNELL.

   This course is open only to freshmen and sophomores. Juniors and seniors enrolling in these sections must elect as Course 101 and will receive but *three hours credit.*

   No credit toward graduation is counted for this course until Course 2 is satisfactorily completed.

1*a*. Elementary French for Juniors and Seniors. The main stress in this course will be on the acquisition of the ability to read French rapidly and accurately. *Four hours credit.* Assistant Professor SCHOLL, and Mr. HAGER.

   No credit toward graduation is counted for this course until Course 2*a* is satisfactorily completed.

2. Elementary French. Continuation of Course 1. For those who have had Course 1, or one year of French in the high school. *Four hours credit.* Assistant Professor SCHOLL, Mr. HAGER, Mr. HOOTKINS, Mr. KERR, Mr. MATHIEU, and Mr. PARGMENT.

3. Elementary French of the Second Year. Modern prose and plays, with practice in speaking and writing. *Four hours credit.* Professors LEVI and THIEME, Assistant Professors

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BURSLEY, MCLAUGHLIN, and SCHOLL, Mr. CARRY, Mr. HACKES, Mr. HAGER, Mr. KERR, Dr. LEARNED, Mr. MATHIEU, Mr. MUYSKENS, Mr. PARGMENT, Mr. PATTERSON, and Mr. ROVILLAIN.

4. Modern prose and plays. Continuation of Course 3. For those who have taken Course 3, or three years of French in the high school. *Four hours credit.* Assistant Professor MCLAUGHLIN, Dr. CLOPPET, Mr. HACKES, Mr. KERR, Dr. LEARNED, Mr. MATHIEU, Mr. ROVILLAIN.

5. Introduction to French Literature. Representative authors of various periods. *Three hours credit.* Professors CANFIELD, LEVI, and THIEME, Assistant Professors MCLAUGHLIN and TALAMON, and Mr. ROVILLAIN.

This course is a prerequisite to all advanced courses in French literature.

7. Composition. Must accompany Course 5 or have been preceded by it. *Two hours credit.* Professor LEVI, Assistant Professor BURSLEY, Mr. HACKES, Mr. PARGMENT, and Dr. CLOPPET.

13*a*. Conversation. *One hour credit.* Open to students taking Courses 3 or 4. Mr. PARGMENT, and Dr. CLOPPET.

13*b*. Conversation *One hour credit.* Open to students taking Courses 5 or 7. Mr. CARRY, and Dr. CLOPPET.

13*c*. Conversation. *One hour credit.* Open to students having had Courses 5 and 7, or the equivalent. Assistant Professor TALAMON.

Courses 13*a*, 13*b*, and 13*c* are intended to accompany and supplement other courses. Each course gives *one hour credit.* The size of the sections is limited and students should consult the instructor before electing these courses. Preference is given those who are preparing to teach.

15. Advanced French Composition. Practice in writing idiomatic French. *Two hours credit.* Assistant Professor TALAMON.

For Graduates and Undergraduates.

17. History of the Novel in France. *Two hours credit.* Professor EFFINGER.

This course will trace the growth of the novel as a form of literature and its various transformations. A number of representative masterpieces of different periods will be read, and both their technical qualities and their relation to the social and intellectual environments will be studied. Particular attention will be given to the preparation and development of realism in the nineteenth century.

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19. Contemporary France. French government and political institutions; political parties; social and religious conditions; industries; literature, art, science, and education. *Two hours credit.* Assistant Professor McLAUGHLIN.

This course is intended to give such a knowledge of the French people of today as will enable one to interpret intelligently the events involving French reported in the current news of the world. Recommended specially for students of journalism, and for those preparing to teach French.

21. Poetry of the Nineteenth Century. *Three hours credit.* Professor CANFIELD.

This course deals with the main aspects of poetry in France from the beginnings of Romanticism to the present time. The chief and representative poets are studied in connection with the currents of thought of the time. Lectures, reading, and discussions.

23. Corneille and Racine. *Three hours credit.* Assistant Professor TALAMON.

[25. French Society and Culture in the Sixteenth, Seventeenth, and Eighteenth Centuries. A survey of the principal factors that contributed to the formation, development, and decay of the classical ideal in French literature. *Three hours credit.* Professor THIEME. Omitted in 1920-1921.]

25*a*. French Criticism. The main representatives of literary criticism in France will be studied in such a way as to form a basis for history of French Criticism. *Three hours credit.* Professor THIEME.

[25*b*. The Literature of the Sixteenth Century. With Montaigne and Rabelais as center of attention, the whole movement of the Renaissance as reflected in letters will be studied. *Three hours credit.* Professor THIEME. Omitted in 1920-1921.]

[27. Molière. A careful study of his comedies. Readings, lectures, and reports. *Two hours credit.* Professor LEVI. Omitted in 1920-1921.]

27*a*. French Grammar. A systematic review. *Two hours credit.* Professor LEVI.

This course is intended specially for those intending to teach French, and have already taken Courses 7 and 8. It aims to develop and systematize the student's knowledge of the forms and particularly of the syntax of French.

28*a*. French Reading for students of Biology. Elect as Zoölogy, Course 28, and Botany, Course 29.

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39. French Pronunciation and Diction. Practice in reading, speaking, and reciting, with a view to acquiring an accurate command of individual French sounds and a correct "accent." *One hour credit.* Assistant Professor TALAMON.

Open only to students who are preparing themselves to teach. The number to be admitted is strictly limited, and the instructor's permission must be obtained before the course is elected.

Primarily for Graduates.

51. Seminary in French Literature. *Two hours credit.* Professor CANFIELD.

The work will consist in special studies connected with the history of French literature. Subjects will be chosen for investigation according to the needs and preparation for students.

53. Historical French Grammar, I. Phonology. Lectures, with illustrative Old French readings. *Two hours credit.* Assistant Professor ADAMS.

[55. Introduction to Old French Literature. Reading of selected texts and lectures. *Two hours credit.* Assistant Professor ADAMS. Omitted in 1920-1921.]

35. French Versification. A critical and historical study of French verse structure from its origin to the present. *Two hours credit.* Professor THIEME.

37. Journal Club. Review of results of current research in the field of Romance languages and literatures, by the instructors of the department and advanced students. *One hour credit.*

59. Anglo-French Linguistic Relations, Tenth to Fifteenth Centuries. *Two hours credit.* Dr. LEARNED.

The aim of the course is to study French accessions to the English vocabulary, their sources and later development, together with certain pertinent syntactical problems. The Old French dialects involved will be noticed, and the phonetic changes in Middle English will be briefly reviewed in connection with the history of the Old French loan-words.

Some knowledge of Anglo-Saxon, Middle English, or Old French is desirable but not necessary.

Undergraduates who have credit for French 1, 2, 3, and 4, or who have had Anglo-Saxon, may be admitted to the course by permission of the Head of the department.

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SECOND SEMESTER

Primarily for Undergraduates.

1. Elementary Course. Grammar and easy reading, with practice in speaking. *Four hours credit.*
No credit toward graduation is counted for this course until Course 2 is satisfactorily completed.

2. Elementary Course continued. Reading of modern prose and plays, with practice in speaking and composition. *Four hours credit.*
This course is open only to freshmen and sophomores. Juniors and seniors enrolling in these sections must elect as Course 102, and will receive but *three hours credit.*

2*a*. Elementary French for Juniors and Seniors. Continuation of Course 1*a*. *Four hours credit.* Assistant Professor SCHOLL, and Mr. HAGER.

3. Elementary French. Continuation of Course 2; also for students who have had two years of French in the high school. *Four hours credit.*

4. Elementary French of the Second Year. Modern prose and plays, with practice in speaking and writing. *Four hours credit.*
The sections of the first semester will be continued at the same hours.

5*a*. Continuation of Course 4. *Four hours credit.* Assistant Professor MCLAUGHLIN, Dr. LEARNED, and Mr. MATHIEU.

6. Introduction to French Literature. Continuation of Course 5. Professors CANFIELD, LEVI, and THIEME, Assistant Professors MCLAUGHLIN and TALAMON, and Mr. ROVILLAIN.
This course is a prerequisite to all advanced courses in French literature.

8. Composition. Continuation of Course 7. Must accompany Course 6 or have been preceded by it. *Two hours credit.* Professor LEVI, Assistant Professor BURSLEY, Mr. HACKES, Mr. PARGMENT, and Dr. CLOPPET.

14*a*. Conversation. *One hour credit.* Open to students taking Course 4 or 5*a*. Professor CANFIELD, Mr. PARGMENT, and Dr. CLOPPET.

14*b*. Conversation. *One hour credit.* Open to students taking Courses 6 or 8. Mr. CARRY.
Open to students who have had 13*c* or 14*b*; to others only after consultation with instructor.

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14*c*. Conversation. *One hour credit.* Open to students who have had 13*c* or 14*b*; to others only after consultation with instructor. Mr. MATHIEU.

Courses 14*a*, 14*b*, and 14*c* are intended to accompany and supplement other courses. Each course gives *one hour credit.* Election of these courses is subject to the same restrictions as that of 13*a*, 13*b*, and 13*c* of the first semester.

16. Advanced French Composition. *Two hours credit.* Assistant Professor TALAMON.

Continuation of Course 15. May also be elected by properly qualified students who have not taken Course 15, after consultation with instructor.

18. The Dramatic Literature of the 18th and 19th Centuries. Professor EFFINGER.

A study of the dramatic work of LeSage, Marivaux, Crébillon, Voltaire, Diderot, Nivelle de la Chaussé, Beaumarchais; the Melodramas of Pixérécourt; the Romantic drama; Scribe; the classical reaction; Dumas fils, Augier, Henri Becque, and the modern school. Lectures in French with assigned readings and reports.

20. Contemporary France. Continuation of Course 19. *Two hours credit.* Assistant Professor MCLAUGHLIN.

22. The Poetry of the Nineteenth Century. Continuation of Course 21. *Three hours credit.* Professor CANFIELD.

24. Molière. *Three hours credit.* Assistant Professor TALAMON.

[26. Continuation of Course 25. French Society and Culture in the Sixteenth, Seventeenth, and Eighteenth Centuries. Professor THIEME. Omitted in 1920-1921.]

26*a*. French Criticism. Continuation of Course 26. *Three hours credit.* Professor THIEME.

[26*b*. French Literature in the Sixteenth Century. Continuation of Course 25*b*. *Three hours credit.* Professor THIEME. Omitted in 1920-1921.]

42. Teachers' Course. *Two hours credit.* Professor THIEME.

This course aims to be of practical help to those who expect to teach French. General questions, such as the place of foreign languages in the school, the aims of language study, methods, text-books, canon of reading, reference books, etc., will be discussed.

28. The Works of Edmond Rostand, with special reference to *Chantecler*. *Two hours credit.* Professor LEVI.

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28*b*. French Reading for Students of Chemistry and Physics. See Chemistry 20*a* and Physics 38.

39. French Pronunciation and Diction. *One hour credit.* Assistant Professor TALAMON.
See the description of the course in the first semester. Elections limited in the same way as in the first semester. It may not be taken a second time.

Primarily for Graduates.

52. Seminary in French Literature. Continuation of Course 51. *Two hours credit.* Professor CANFIELD.

54. Historical French Grammar, II. Morphology. Lectures and readings. *Two hours credit.* Assistant Professor ADAMS.

[56. Introduction to Old French Literature. Continuation of Course 55. *Two hours credit; hours to be arranged.* Assistant Professor ADAMS. Omitted in 1920-1921.]

60. Continuation of Course 59. *Two hours credit.* Dr. LEARNED.

SUMMER SESSION OF 1921

1*s*. Beginners' Course. *Six hours credit.* Assistant Professor KENYON.

1. Beginners' Course. *Four hours credit.* Professor WAIT.

2. French of the Second Semester. *Four hours credit.* Mr. BARNETT.

3. Second Year French. *Four hours credit.* Dr. LEARNED.

4. Modern Prose. *Four hours credit.* Assistant Professor BURSLEY.

5*b*. Introduction to French Literature. *Two hours credit.* Assistant Professor TALAMON.

7. Composition. *Two hours credit.* Assistant Professor MCLAUGHLIN, and Dr. CLOPPET.

13*s*. Conversation. *Two hours credit.* Dr. CLOPPET.

15. Advanced Composition. *Two hours credit.* Dr. CLOPPET.

19*s*. Contemporary France. *Two hours credit.* Assistant Professor MCLAUGHLIN.

41. French Literature in the Twentieth Century. *Two hours credit.* Assistant Professor TALAMON.

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42. Teachers' Course. *Two hours credit.* Professor CANFIELD.

44. Outline History of French Literature. *Two hours credit.* Professor THIEME.

45. French Pronunciation and Diction. *Two hours credit.* Assistant Professor TALAMON.

For Graduates.

51. French Literature of the Sixteenth Century. *Two hours credit.* Professor THIEME.

53. Outlines of Old French Grammar. *Two hours credit.* Dr. LEARNED.

54. Old Provençal. *Two hours credit.* Assistant Professor ADAMS.

61. Seminary in French Literature. *Two hours credit.* Professor CANFIELD.

63. Introduction to Romance Philology. *Two hours credit.* Professor CANFIELD.

Italian

FIRST SEMESTER

1. Italian Grammar. Easy Prose. *Three hours credit.* Mr. DE FILIPPIS.
No credit towards graduation is counted for this course until Course 2 is satisfactorily completed.

3. Dante. *La Vita Nuova* and *La Divina Commedia.* Lectures and recitations. *Two hours credit.* Assistant Professor MCLAUGHLIN.

SECOND SEMESTER

2. Continuation of Course 1. Modern readings. *Three hours credit.* Mr. DE FILIPPIS.

4. Dante. *La Divina Commedia.* Continuation of Course 3. Lectures and recitations. *Two hours credit.* Assistant Professor MCLAUGHLIN.

SUMMER SESSION OF 1921

1*s*. Beginners' Course. *Four hours credit.* Mr. ————.

For Graduates.

3*s*. Dante. *Two hours credit.* Assistant Professor MCLAUGHLIN.

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Spanish

Students especially interested in the study of language are advised to elect two foreign languages in the freshman year. Two new languages, however, should not be begun at the same time. See page 155.

Courses 1 and 2 must precede all others. Students whose purpose in taking up Spanish is to acquire fluency in speaking and writing, should then take Courses 3, 4, 7, 8, 19, 20, and 21. Those desiring to acquire a knowledge of the literature of Spain should follow Courses 1 and 2 by 3, 4, 5, 6, and then 9 and 10, or 22 and 23.

Students who have had one year of Spanish in preparation for the University should enter Course 2.

Prospective teachers of Spanish should secure an early start and consult with Professor WAGNER at the earliest opportunity.

FIRST SEMESTER

1. Elementary Course. Grammar, oral work, and reading. *Four hours credit.* Assistant Professor BURSLEY, Dr. BARJA, Mr. BEMENT, Mr. EDDY, Mr. ESTEVES, Mr. HERING, Mr. HOOTKINS, Mr. KERR, Mr. LINCOLN, Mr. MICHAUD, Mr. PATTERSON, Mr. REY, Mr. DEL TORO, Mr. WILLEY.
   No credit toward graduation is counted for this course until Course 2 is satisfactorily completed.

2. Elementary Course. Continuation of Course 1. *Four hours credit.*

3. Second Year. Composition, conversation, and reading of selected texts. *Four hours credit.* Professor WAGNER, Assistant Professor BURSLEY, Mr. HERING, Mr. LINCOLN, Mr. MERCADO, Mr. DEL TORO, Mr. WILLEY.

4. Second Year. Continuation of Course 3. *Four hours credit.* Mr. LINCOLN.

5. Cervantes and his Contemporaries. *Three hours credit.* Professor WAGNER.
   An introduction to Spanish life and literature of the Golden Age. Open to students who have completed Course 4 or the equivalent.

7. Advanced Spanish Composition. *Two hours credit.* Mr. MERCADO, and Mr. WILLEY.
   Open to students who have completed Course 4 or an equivalent.

9. The Drama of the Seventeenth Century. *Three hours credit.* Professor WAGNER.
   Open to students who have completed Courses 5 and 6, or an equivalent.

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[11. The Early Spanish Novel and Its Influence in Europe. *Two hours credit.* Professor WAGNER.
Primarily for graduates. May be elected only after consultation with the instructor. Omitted in 1920-1921.]

[13. General View of Spanish Literature. *One hour credit.* Omitted in 1920-1921.]

15. Spanish Historical Grammar and Introduction to Old Spanish Literature. *Two hours credit.* Professor WAGNER.
Primarily for graduates.

19. Spanish and Spanish-American Life and Literature. Lectures, assigned readings, reports, and quizzes. Conducted in Spanish. *Three hours credit.* Mr. DEL TORO, and Dr. BARJA.
This course is designed to increase the student's practical knowledge of Spanish, and at the same time to give him general information regarding the Spanish-speaking countries, their literature, life, and customs, and their relations to ourselves.
Mr. DEL TORO's sections will deal with Spanish America, and Dr. BARJA's with Spain.
Open to students who have had Spanish 3 and 4 or the equivalent.

21. Advanced Conversation. *Two hours credit.* Dr. BARJA.
Open only to students who have had Course 20 or the equivalent. Primarily for prospective teachers, and may be followed in the second semester by Course 17.

[23. Modern Spanish Literature. Lectures, reports, and discussions, covering the Spanish drama, poetry, and novel of the Nineteenth and Twentieth centuries. *Three hours credit.* Professor WAGNER.
Open to students who have completed Courses 5 and 6 or an equivalent. Omitted in 1920-1921.]

SECOND SEMESTER

1. Elementary Course. Grammar, reading, and oral work. *Four hours credit.*
No credit toward graduation is counted for this course until Course 2 is satisfactorily completed.

2. Elementary Course. Continuation of Course 1. Reading of modern prose, with practice in speaking and writing. *Four hours credit.*

3. Continuation of Course 2. *Four hours credit.*

4. Second Year. Continuation of Course 3. *Four hours credit.*
All sections continued from first semester.

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6. Cervantes and His Contemporaries. Continuation of Course 5. *Three hours credit.* Professor WAGNER.

8. Advanced Composition. Continuation of Course 7. *Two hours credit.*
Sections and instructors as in the first semester, unless otherwise announced.

10. The Drama of the Seventeenth Century. Continuation of Course 9. *Three hours credit.* Professor WAGNER.

[12. The Early Spanish Novel. Continuation of Course 11. *Two hours credit.* Professor WAGNER.
Omitted in 1920-1921.]

[14. General View of Spanish Literature. Continuation of Course 13. *One hour credit.* Professor WAGNER. Omitted in 1920-1921.]

16. Old Spanish Literature. Continuation of Course 15. *Two hours credit.* Professor WAGNER.

17. Teachers' Course. *Two hours credit.* Professor WAGNER.
An attempt to contribute toward the practical preparation of the teacher. Lectures, readings, and problems. Discussion of values and aims, methods old and new, text-books, curricula, history of the Spanish language and elementary Spanish phonetics.

20. Spanish and Spanish-American Life and Literature. Continuation of Course 19. *Three hours credit.*
Sections and instructors as announced for the first semester.

[24. Modern Spanish Literature. Continuation of Course 23. *Three hours credit.* Professor WAGNER. Omitted in 1920-1921.]

SUMMER SESSION OF 1921

1. Beginners' Course. *Four hours credit.* Mr. MICHAUD.

2. Elementary Course. *Four hours credit.* Mr. LINCOLN.

3. Second Year Spanish. *Four hours credit.* Mr. WILLEY.

4. Continuation of Course 3. *Four hours credit.* Assistant Professor BURSLEY, and Mr. MICHAUD.

7. Advanced Practical Spanish. *Two hours credit.* Mr. WILLEY.

17. Teachers' Course. *Two hours credit.* Professor WAGNER.

19. Latin-American Life and Literature. *Four hours credit.* Mr. DEL TORO.

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For Graduates.

5. The Don Quixote. *Two hours credit.* Mr. DEL TORO.

11. The Early Spanish Novel and its Influence in Europe. *Two hours credit.* Professor WAGNER.

23. The Modern Spanish Novel. *Two hours credit.* Professor WAGNER.

ROMAN LAW AND JURISPRUDENCE

The courses in Roman Law are closely associated with the work in Latin. Either of the courses may be taken with profit by the student of Latin who is also interested in history or law.

FIRST SEMESTER

1. Roman Private Law. The History and Fundamental Principles of Roman Private Law. *Two hours credit.* Professor DRAKE.
10. The Science of Jurisprudence. *Two hours credit.* Professor DRAKE.

Russian

(See Indo-European Languages and Literatures.)

Sanskrit

(See Indo-European Languages and Literatures.)

Scandinavian

(See Germanic Languages and Literatures.)

SEMITICS, INCLUDING STUDIES IN THE ENGLISH BIBLE AND THE HISTORY OF RELIGIONS

(GROUP I)

The department of Semitics, while carefully avoiding sectarian instruction, offers courses in Religious History, Biblical Literature, Geography, and History, and the Semitic languages upon the same basis as courses in other departments of language, literature, history, etc. All the non-linguistic courses are open to students who have not taken the languages offered by the department.

Students who intend to pursue theological studies are advised to consult the head of the department as to the lines of study which may be pursued with greatest advantage in connection with Semitics, and as a preparation for the work of the theological seminary.

Students may begin the study of Hebrew in their sophomore year, *and those who intend to enter a theological seminary,* or make a special study of Semitics, are advised to begin early in their course.

Students who have taken Hebrek and Hellenistic (New Testa-

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ment) Greek for four semesters are allowed special privileges in several of the theological seminaries. *Note the following:*

(1) They may graduate in two years, thus saving a whole year; or,

(2) They are permitted to enter upon advanced courses for which they would not, otherwise, be prepared. They are thus enabled to gain a commanding knowledge of the *Literature of the Bible* which is impossible to students who are compelled to spend a large portion of their junior and middle years in the seminary in the purely academic work of learning languages, and, further, are enabled to enter into competition for the large fellowships offered by the seminaries for foreign studies.

CONSULTATION HOURS.—September 20 to 24, 10 to 12, Room 201, M. H.

The courses in Hellenistic (New Testament) Greek, formerly given in the department of Semitics, will now be found in the department of Greek.

Hebrew

FIRST SEMESTER

1. Course for Beginners. Grammar and easy reading. *Three hours credit.* Professor WATERMAN.

3. Intermediate Hebrew. Critical reading of the books of Samuel and Kings. *Two hours credit.* Professor WATERMAN.

SECOND SEMESTER

2. Continuation of Course 1. Reading of selections from Genesis; grammar and Hebrew prose writing. *Three hours credit.* Professor WATERMAN.

4. Continuation of Course 3. Isaiah, Chapters 40-55, and selections from the Minor Prophets. *Two hours credit.* Professor WATERMAN.

A critical reading of the prophecies in Hebrew, with an interpretation of them in the historical light of their times.

Assyrian

5. Course for Beginners. *Three hours credit.* Professor WATERMAN.

Aramaic

[7. Grammar and Reading of the Aramaic parts of the Old Testament (Daniel 2:4-7, and 27; Ezra, 4:8—6:18, and 7:12-26). *Three hours credit.* Professor WATERMAN. Omitted in 1920-1921.]

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Arabic

[9. Course for Beginners. Grammar and easy reading. *Three hours credit.* Professor WATERMAN. Omitted in 1920-1921.]

Semitic History and Literature

FIRST SEMESTER

11. A Historical Survey of the Semitic Orient from Prehistoric Times to 1200 B. C. *Two hours credit.* Professor WATERMAN.

13. The Origin of the Bible. *Two hours credit.* Professor WATERMAN.
A study of its formation and transmission, consisting of a detailed analysis and chronological arrangement of the Old Testament and Apocrypha, together with the transition to the New Testament. Special attention is given to the place of the various writings in the development of religion and their relation to the present.

17. Israelitish History and Prophecy. *Two hours credit.* Professor WATERMAN.
This course will deal with the developments and the mutual relations of history and prophecy in the great creative periods of Israel's religion, from the 9th to the 7th century, B. C.
Prerequisite: Course 13 or equivalent.

19. The Scriptures and Democracy. *Two hours credit.* Professor WATERMAN.
This course will deal with the origin and development of the institutions and ideals of the Old and New Testaments in relation to modern Democracy.

SECOND SEMESTER

12. The History of Israel. *Two hours credit.* Professor WATERMAN.
This course will cover Israelitish development from 1200 B. C. to the fall of Jerusalem, 70 A. D.
Students contemplating this course, who have not had Course 13 or an equivalent, should consult with the head of the department.

14. Biblical Introduction. Continuation of Course 13. *Two hours credit.* Professor WATERMAN.

18. The Bible as Literature. *Two hours credit.* Professor WATERMAN.
This course will consist of a critical study of the chief literary masterpieces of the Bible from the literary standpoint, as con-

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tributions to world literature. Particular attention will be given to the Book of Job, The Psalms, and examples of Hebrew poetry and oratory as exemplified in the prophets. The American Revised Version will constitute the text-book.

The History of Religions

FIRST SEMESTER

15. The Religions of the Semites. *Two hours credit.* Professor WATERMAN.
A survey of the religions of Babylonia (Egypt), Palestine, and Arabia, in their mutual relations.

19. Elementary Phenomena of Religion. *Two hours credit.* Professor BONNER.
A study of primitive forms of religion, such as fetichism, animism, ancestor-worship, magic, etc. Lectures, assigned readings, and reports.

SECOND SEMESTER

16. The Ethnic Faiths. *Two hours credit.* Professor WATERMAN.
A general survey of the great living Ethnic Faiths of India, Persia, China, and Japan.

Sociology

(See Economics)

SPANISH

(See Romance Languages and Literatures)

Statistics

(See Mathematics)

ZOOLOGY

(GROUP II)

The department of Zoölogy occupies the northwest portion of the new Natural Science building. The easiest approach from the interior of the Campus is by the west entrance to the auditorium in the Natural Science building.

CONSULTATION HOURS.—All students who expect to do advanced work in Zoölogy should confer with the *advisory committee of the department* before making elections. This committee, which consists of Professor REIGHARD and Assistant Professors LA RUE and OKKEL-

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BERG, will meet in Room Z 231, N. S., 10 to 12 A. M. daily from September 20 to 26, inclusive. Other hours will be posted on the department bulletin board. First-year students who elect Zoölogy 1 should consult the Committee on Elections.

FIRST-YEAR ELECTIVES.—Course 1 should precede all other Zoölogy courses except 3, 3*a*, and 20. Premedical students, forestry students, and all others who elect Zoölogy 1 in either semester of their freshman year, must take Botany 1 or 1*a* in the other semester.

SECOND-YEAR ELECTIVES.—Those who elect Zoölogy 1 in the first semester of their second or later years may take Zoölogy 4, 5*a*, or 11 in the second semester of the same year.

ADVICE TO STUDENTS.—The work of the Zoölogy department is planned to meet the needs of the following classes of students:

1. *Those who have little time for the subject and who seek a knowledge of the concrete facts and the theories of biology as part of a liberal education* should take the courses listed as introductory (Courses 1, 3, 3*a*, and 20), but may, in addition, pursue to advantage any of the following courses: 4, 5*a*, 7, 8, 8*a*, 9, 10, 11, 15, 15*a*, 21. The order of the election of these courses will vary with the needs of the student, and should be determined after consultation with the advisory committee of the department.

2. *Students who are preparing to study medicine,* and who have had Course 1 in Zoölogy and 1 or 1*a* in Botany, or their equivalent, should take as many as possible of the following courses: Courses 5*a*, 9, 10, 11, 15, and 15*a*.

3. *Students of Forestry* are required to take Course 1 or its equivalent and should, if possible, elect in the order named Courses 3, 20, and 7. The attention of students intending to study for the degree of Master of Science in Forestry is called to the special bulletin describing the Curriculum in Forestry.

4. *Students preparing to teach Zoölogy in secondary schools are advised* to elect, preferably in the order given, the following courses: 1, 7, 4, (3),)*a*), 18, (18*a*), 5*a*, 8, 8*a*, and 11, and Education 4*g*. Those who wish to receive the departmental recommendation to teach Zoölogy as their principal subject in secondary schools are *required* to complete satisfactorily all of these courses or their equivalent, except those enclosed in parentheses. A formal departmental recommendation signed by the members of the Zoölogy staff will be given to such students. Students who show unusual proficiency in Zoölogy may be recommended, at the discretion of the Zoölogy staff, to teach Zoölogy as a minor subject in secondary schools after taking Courses 1, 4 or 7, 11, and 18.

5. *Students who wish to become regular assistants in the department,* or who expect to become professional zoölogists, should elect,

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after Course 1, Courses 18 and 18*a*. Students in these courses are given an opportunity to become acquainted with the methods of conducting a laboratory. For details, see the announcement of Courses 18 and 18*a*. To gain entrance to these courses, the student must have attained a satisfactory grade in Course 1. Other things being equal, those who have had Courses 18 and 18*a* will be given preference in the selection of the regular assistants in the department.

6. *Candidates for the higher degrees* should consult the Announcement of the Graduate School. Their work should be elected only after consultation with the advisory committee of the department, but will always include Courses 12 and 13. Those who expect to teach should arrange their work to include the courses in the first list of paragraph 4 above.

LABORATORY WORK.—The time necessary each week for the average student to do the laboratory work of each course is indicated by the number of required laboratory periods of three hours, but varies with the capacity of the student. Students must do their laboratory work during the regularly scheduled hours, but those for whom this time is insufficient will have an opportunity to complete the work at other hours.

RELATED COURSES IN OTHER DEPARTMENTS.—The department of Zoölogy does not offer courses on fossil animals, but students of Zoölogy should consult the announcement of the department of Geology, where courses in *Paleontology* are described.

Students interested in the philosophical aspects of biology, or in psychology, will find courses in these fields offered in the department of Philosophy.

Biological Station

Courses in the Natural History of Vertebrate Animals, Invertebrate Animals, Birds and Insects, and research work on birds, fishes, insects, plankton organisms, and parasitic worms, are offered during the summer session at the University of Michigan Biological Station situated on Douglas Lake, Cheboygan County, Michigan. For the details of these courses, see the special bulletin of the Biological Station.

Woods Hole Scholarship

Through the kindness of Doctor Bryant Walker, the University is able to offer a scholarship which pays the tuition of one student at the Marine Biological Laboratory, Woods Hole, Mass., during the summer session of six weeks. *Six hours credit* may be obtained at the University for work done at Woods Hole. Application should be made to Professor REIGHARD.

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FIRST SEMESTER

*I. Introductory Courses.**

1. Principles of Animal Biology. *Four hours credit.* Lectures, recitations, and laboratory work. Professor SHULL, Assistant Professors WELCH, LARUE, and OKKELBERG, Dr. HEILBRUNN, Dr. BLANCHARD, Mr. THATCHER, and Assistants.

This course is designed to introduce the student to the fundamental principles in each of the major divisions of biology. The elementary facts of structure, physiology, classification, ecology, geographical distribution, paleontology, and evolution are discovered at first hand. Except in the exercises on classification, animals are not studied as representative of certain groups, but only in so far as they furnish the basis for drawing conclusions regarding principles.

Prospective medical students who expect to elect Organic Chemistry 10 in the second semester, simultaneously with biology, will avoid conflict by electing Zoölogy 1 in the first semester, and Botany 1 in the second semester.

Each student should register in one laboratory section and one quiz section. This registration, whether by first year students or others, *must be made through the Committee on Freshman Classification.* When the laboratory and quiz sections are filled by such elections, no others will be admitted. The laboratory and quiz section should, if possible, be under the same instructor.

3. Organic Evolution. *Two hours credit.* Lectures. Professor REIGHARD.

The illustrated lectures deal with the evidences for evolution drawn from classification, structure, development, paleontology, distribution, variation, and experiment, and under the head of factors, with such topics as natural selection, the inheritance of acquired characters, and the influence of environment.

No prerequisite. Freshmen should not elect this course.

This course may profitably be followed by Course 3*a* in the second semester.

20. The Conservation of Wild Life. *Two hours credit.* Lectures, quizzes, and supplementary reading. Professor RUTHVEN.

This course discusses the importance of the conservation of animals and the factors and methods employed. The animals of economic value are shown to constitute a natural resource of considerable value, and from an analysis of the factors in-

* Introductory courses are those without prerequisites. Course 1 is open to freshmen, but Courses 3, 3a, and 20 must not be elected by freshmen.

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volved and the methods in vogue an attempt is made to develop the principles that should guide intelligent efforts to conserve these forms. The course should be of general interest at this time, and should appeal particularly to prospective teachers of Zoölogy, foresters, and others who will come in contact with wild life.

*II. Advanced Courses.**

8. Natural History of Animals, with special reference to the principles of ecology and behavior. *Four hours credit.* Lectures, quizzes, laboratory, and field work. Professor REIGHARD.

Courses 8 and 8*a* form a year's work, the *purpose* of which is:

(1) To present in a systematic way those fields of natural history that have been organized into sciences. These fields are (a) the relations of animals to environment (animal ecology), and (b) animal behavior.

(2) To acquaint students with the animals of the region—both invertebrate and vertebrate—in their natural surroundings. Only those invertebrates are considered that are of importance in presenting the facts and principles of ecology. The classification of vertebrates is studied in considerable detail, but little time is given to the classification of invertebrates. This subject is taken up in more detail in Courses 4 and 7.

(3) To afford a training in the technique of the subject. Emphasis is laid on methods of field observations and on field notes. The notes are criticized and discussed with the purpose of developing scientific method in biology.

The *field work* is carefully planned and regularly carried out after the manner of laboratory work. It includes, on the side of ecology, the recognition and description of the principal local habitats and of the more important members of their animal communities. The reactions of typical forms to environmental factors are experimentally tested as far as possible. On the side of behavior the field recognition and behavior of fishes, amphibia, reptiles, birds, and mammals are taken up in detail. The order of the field work is determined by the seasons. Aquatic habitats (fresh water biology) is the chief topic in the fall. The winter months are devoted largely to indoor work on vertebrates, but include some field work. In the spring the field work is devoted to the behavior of vertebrates and to terrestrial habitats. Occasionally all-day Saturday excursions are made. *The half days on which this work is scheduled must be free from other work.*

* Advanced courses are those with Course 1 in Zoology or its equivalent as a prerequisite. Other prerequisites are required in certain cases and are announced in the descriptions of the courses.

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The courses are of cultural value and are required of those who expect the departmental recommendation to teach Zoölogy as a major subject in secondary schools. These courses should be preceded by Course 1 or its equivalent.

Courses 8 and 8*a* are prerequisites for Course 21.

4. Invertebrate Zoölogy. *Four hours credit.* Assistant Professor WELCH.

This course deals especially with the classification, morphology, embryology, physiology, and life histories of the invertebrates exclusive of insects. Most of the work is given in the form of lectures, laboratory, field trips, and demonstrations. The lectures deal with the general aspects of invertebrate zoölogy, while the laboratory work is concerned mainly with detailed morphological studies of a selected series of invertebrates, and the classification of typical forms. Field work is organized primarily to familiarize the student with the common invertebrates in the living state and with some of the main features of local distribution. Laboratory studies of living forms are also included.

9. Embryology of Vertebrates. Lectures and laboratory work. *Five hours credit.* Assistant Professor OKKELBERG.

A course on the descriptive embryology of vertebrates. The lectures are comparative; the laboratory work, dealing largely with the organogeny of the chick, is supplemented by the demonstration and study of other forms. Some attention is given to the simpler embryological laboratory methods. Zoölogy 1 or its equivalent is prerequisite.

10. General Physiology. *Four hours credit.* Lectures and laboratory work. Dr. HEILBRUNN.

An introduction to the modern methods and results of general physiology. This is the science of living matter considered in its most general aspects. It deals especially with those phenomena which are universally associated with the living process, and which are therefore common to all types of plant and animal life. In the lectures attention is first directed to the structural, physical, and chemical makeup of protoplasm. The activities of living cells and organisms are then considered. These include metabolism, movement, response to stimulation. The attempt is made to understand the various forces which are involved in vital activity. The laboratory work helps to illustrate the lectures and at the same time afford training in certain chemical and physical manipulations which are important for many phases of biological work.

This course may usually be elected with profit only by seniors and undergraduates adequately prepared in the fundamental sciences; others may be admitted after consultation.

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15. Genetics. *Three hours credit.* Lectures, quizzes, and demonstrations. Professors SHULL and BARTLETT.

This course gives a comprehensive view of the subjects of heredity and variation. The student is given an opportunity to become familiar with the genetical investigations in progress in both the departments of Zoölogy and Botany, as, for example, sex determination in rotifers and insects, complicated Mendelian phenomena in Drosophila, mutation and hybridization phenomena in Oenothera, and practical plant breeding projects.

Open to graduates and to qualified undergraduates. Students in sociology and prospective medical students who have had some training in biology will find that this course affords a basis for the understanding of human heredity.

Courses 15 and 15*a* form a continuous year's work. Those who elect Course 15 should, if possible, elect Course 15*a* in the second semester.

18. Laboratory Methods and Management. *Three hours credit.* Laboratory work and conferences. Assistant Professor LA RUE.

Courses 18 and 18*a* are designed to give prospective teachers, assistants, and those who plan to become professional zoölogists actual training in the methods employed in the conduct of a zoölogical laboratory. The work of the first semester (Course 18) is extremely varied. The student is introduced to many types of technique (other than microscopic) not ordinarily presented in the usual courses. Some of the methods taken up are photography, the collection of laboratory materials and their preservation, the rearing of cultures, care of aquaria, care of laboratory rooms, glassware, and instruments, the structure and use of the microscope and its accessories, projection apparatus, the making of charts and skeletons. Students electing the course should be provided with cameras. Those who expect to become assistants in the department should elect Course 18 and follow it with course 18*a*. Prospective teachers who wish to receive the recommendation of the department must take Course 18.

12. Literature of Zoölogy. *One hour credit.* Professor REIGHARD and Assistant Professor OKKELBERG.

The instructors and advanced students form a Journal Club, which holds stated meetings. Reports are made on research work done by members of the zoölogical staff, and on important current papers, and are followed by informal discussion. Although the meetings are open to all, the membership is restricted. The course should be elected only after consultation. Participation in the work of the Journal Club is required of all assistants in the department, and the course must be *elected* for at least one semester, by all graduate students whose

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principal subject is Zoölogy. Candidates for the doctorate are required as having elected the course for their term of residence.

16. Classification and Natural History of Animals.
The course may be elected as 16*a*, *two hours credit;* 16*b*, *three hours;* 16*c*, *five hours;* or 16*d*, *ten hours. Permission must be first obtained from the advisory committee of the department.*
The time and place of carrying on the work should be arranged in accordance with the group selected with one of the members of the staff named below:
The Fishes: Professor REIGHARD, and Mr. HUBBS.
The Reptiles: Professor RUTHVEN.
The Thysanoptera: Professor SHULL.
Animal Parasites: Assistant Professor LA RUE.
The Insects and Oligochaetes: Assistant Professor WELCH.
The Mammals: Dr. DICE.
The Insects: Mr. GAIGE.
The purpose of this course is to increase our knowledge of the fauna of the region and to give students an opportunity to become acquainted with the methods and aims of systematic work, and the natural history and classification of the forms in particular groups.

25. Advanced Zoölogical Studies.
This course is intended to introduce the student to the methods used by the investigator in zoölogy. The work is individual. To each student will be assigned a topic. He will be required to examine the original literature and in some cases to prepare specimens illustrating the topic. The results of his work must be embodied in a report. The course is required of those selecting zoölogy as a major subject for the master's degree, and may, at the option of the zoölogical faculty, be required of those selecting zoölogy as a major for the doctorate. *Application should be made to the advisory committee of the department.* The work may be pursued under the direction of any member of the zoölogical faculty. The course should be elected in the name of the person with whom the work is to be done, as 25*a*. *two hours credit;* 25*b*, *three hours;* 25*c*, *five hours;* or 25*d*, *ten hours.*

28. French Reading. *One hour credit.* Professor LEE.
Classical biological treatises in French as well as important papers in the current literature will be selected. The purpose of the course is to cultivate facility in reading the literature of biology and to familiarize the student with the technical terms of the science. The course should be of value to students of zoölogy, botany, medicine, and related sciences.

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31. Investigations in the Behavior of Fishes and other Lower Vertebrates in their Natural Environment. This work may be elected as 31*a*, *two hours credit;* 31*b*, *three hours;* 31*c*, *five hours;* 31*d*, *ten hours.* Professor REIGHARD.

33. Investigations in Zoögeography. This work may be elected as 33*a*, *two hours credit;* 33*b*, *three hours;* 33*c*, *five hours;* 33*d*, *ten hours.* Professor RUTHVEN.

35. Investigations in Entomology and on Oligochaeta. This work may be elected as 35*a*, *two hours credit;* 35*b*, *three hours;* 35*c*, *five hours;* 35*d*, *ten hours.* Assistant Professor WELCH.

37. Investigations in Genetics. This work may be elected as 37*a*, *two hours credit;* 37*b*, *three hours;* 37*c*, *five hours;* 37*d*, *ten hours.* Professor SHULL.

39. Investigations in General Physiology. This work may be elected as 39*a*, *two hours credit;* 39*b*, *three hours;* 39*c*, *five hours;* 39*d*, *ten hours.* Dr. HEILBRUNN.

41. Investigations in Helminthology. This work may be elected as 41*a*, *two hours credit;* 41*b*, *three hours;* 41*c*, *five hours;* 41*d*, *ten hours.* Assistant Professor LA RUE.

SECOND SEMESTER

*I. Introductory Courses.**

1. Principles of Animal Biology. *Four hours credit.* Lectures, recitations, and laboratory work. Professor SHULL, Assistant Professors LA RUE, WELCH, and OKKELBERG, Dr. HEILBRUNN, Dr. BLANCHARD, Mr. THATCHER, and Assistants.

A repetition of Course 1, given in the first semester.

Each student should register in one laboratory section and one quiz section. This registration, whether by first year students or others, *must be made through the Committee on Freshman Classification.* When the laboratory and quiz sections are filled by such elections no others will be admitted. The laboratory and quiz sections should, if possible, be under the same instructor.

3*a*. Heredity. *Two hours credit.* Lectures and quizzes. Professor SHULL.

A semi-popular account of the facts of heredity as developed since the year 1900, with emphasis on their relation to human affairs. The earlier lectures deal with the elementary facts of reproduction and development, the mechanism through which

* Introductory courses are those without prerequisites. Course 1 is open to freshmen, but Courses 3, 3a, and 20 must not be elected by freshmen.

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heredity is manifested, the results of hybridization, including Mendel's Law, and the determination of sex. These are followed by heredity in man, with its application in the broadest sense, including eugenics, popular fallacies and superstitions, maintenance of racial qualities, and the effects of war. While the course is primarily of interest to those specializing in the biological and social sciences, it is designed to meet certain needs common to all classes of students. It is desirable, when possible, to precede this course with Course 3 in the first semester.

No prerequisites. A more advanced treatment of heredity is given in Courses 15 and 15*a*.

*II. Advanced Courses.**

7. General Entomology. *Four hours credit.* Assistant Professor WELCH.

This course deals with the fundamental aspects of general entomology and is intended to contribute to the preparation necessary for professional work in zoölogy as well as to constitute a foundation for special work with insects. The material is presented in lectures, laboratory work, field studies, and demonstrations. The lectures are general, including among other subjects the following: Classification of insects and their relatives; morphology, physiology; embryology; phylogeny; metamerism; reproduction, including parthenogenesis, paedogenesis; polyembryony, and gynandromorphism; metamorphosis; respiration; aquatic insects and their evolution; regeneration; interrelations of insects; insects and disease; and insects in relation to other organisms. Laboratory work includes morphological studies on certain representative types, followed by the classification of an extensive series of selected forms. The generous amount of field work provides training in the problems of local distribution, field recognition of common species, approved methods of collection, and construction of field records. Life history studies involving field and vivarium work are included. Methods of mounting and preservation are also considered.

8*a*. Vertebrate Zoölogy. Natural History of Animals, with special reference to the principles of ecology and behavior. *Five hours credit. Two* laboratory or field periods required (*total, nine hours*). Professor REIGHARD.

This course deals chiefly with the recognition and behavior of local vertebrates, but may include a general study of terrestrial habitats (ecology). See announcement of Course 8 in the first

* Advanced courses are those with Course 1 in Zoology or its equivalent as a prerequisite. Other prerequisites are required in certain cases and are announced in the descriptions of the courses.

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semester. The course should be preceded by Course 8, but, *upon consultation,* exceptions may be made to this rule.

Occasional all-day Saturday excursions. The three half days scheduled for field work must be entirely free from other course work, but the work will usually be accomplished in two half days.

5*a*. Comparative Anatomy and Physiology of Vertebrates. Lectures, quizzes, and laboratory work. *Four hours credit.* Assistant Professor OKKELBERG.

The lectures deal with the comparative anatomy, comparative physiology and evolution of the various vertebrate organs and systems of organs. The classification of vertebrates in relation to their evolution is also discussed. The lectures are supplemented by demonstrations. The laboratory work consists in the dissection of vertebrate types, including fish, amphibian, reptile, bird, and mammal. The course is of value to students of medicine and dentistry as well as to teachers and others. It may follow Zoölogy 1.

18*a*. Laboratory Methods and Management. *Three hours credit.* Laboratory work and conferences. Assistant Professor LA RUE.

A continuation of Course 18, but emphasis will be placed on the methods of zoölogical microtechnic. Opportunity will be given for the gaining of a wide experience in the use of various fixing agents, method of embedding and staining. This course is required of those who expect to become assistants in the department and is of value to prospective teachers, and to those who expect to become professional zoölogists.

11. Mammalian Anatomy and Physiology. *Four hours credit.* Lectures, quizzes, and laboratory work. Dr. HEILBRUNN.

While this course is designed primarily for students who expect to teach physiology and hygiene in secondary schools, it may also be taken with profit by others who may have no opportunity to study human physiology. The laboratory work includes the dissection of a mammal (the cat), whose structure closely resembles that of man. Gross dissection is supplemented by the study of histological structures in so far as it may be necessary to an understanding of physiological principles. Physiological experiments are performed to demonstrate the activities of the various structures of the body and acquaint the student with physiological methods. The lectures deal primarily with the functions of the various systems of the body studied in the laboratory and with structure only as it relates to function.

Course 1 in Hygiene may profitably accompany this course or follow it.

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15*a*. Genetics. *Three hours credit.* Lectures, quizzes, and demonstrations. Professors SHULL and BARTLETT.
A continuation of Course 15 in the first semester.

21. Zoögeography. Lectures and laboratory. *Three hours credit.* Museum of Zoölogy. Professor RUTHVEN.

The course is a discussion of the distribution of animals, approached not from the standpoint of the present distribution of animal groups, but rather from the point of view of the factors involved in migration and ecesis. It deals with those relations existing between the animal forms concerned and the environment, that have an influence upon distribution, and upon this basis an attempt is made to interpret the present conditions.

The lectures discuss the general subject and are supplemented by field and laboratory work on the local fauna and museum material. The student thus becomes familiar with materials illustrative of the principles discussed in the lectures as well as with the methods of study.

Prerequisites: Courses 8 and 8*a*.

24. Museum Methods. *Two hours credit.* Professor RUTHVEN.

This course is designed for students who wish to specialize in Zoölogy and contemplate museum work as a profession. The nature of the zoölogical studies which can best be carried on in museums is described, and instruction is given in the methods of preserving and caring for material, the preparation of manuscripts and illustrations for publication, and other museum work. The course is given in the Museum of Zoölogy, and the methods, specimens, and equipment used are those of the Museum.

The number of elections is restricted, and permission to take the course must be obtained from Professor RUTHVEN.

13. Literature of Zoölogy. Continuation of Course 12. *One hour credit.* Professor REIGHARD, and Assistant Professor OKKELBERG.

Course 13 has the same restrictions as Course 12. The work of the course must be participated in by all assistants in Zoölogy, and it must be *elected* by all candidates for higher degrees whose principal subjects is Zoölogy.

17. Classification and Natural History of Animals. Continuation of Course 16. The course may be elected as 17*a*, *two hours credit;* 17*b*, *three hours;* 17*c*, *five hours;* or 17*d*, *ten hours. Application should be made to the advisory committee of the department.*

The subjects and teachers are the same as in Course 16.

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26. Advanced Zoölogical Studies. Identical with Course 25, which see. The course may be elected as 26*a*, *two hours credit;* 26*b*, *three hours;* 26*c*, *five hours;* or 26*d*, *ten hours. Application should be made to the advisory committee of the department.*

29. German Reading. *One hour credit.* Professor LEE.
This course is of the same nature as Course 28, given in the first semester.

32. Investigations in the Behavior of Fishes and other Lower Vertebrates in their Natural Environment. This work may be elected as 32*a*, *two hours credit;* 32*b*, *three hours;* 32*c*, *five hours;* 32*d*, *ten hours.* Professor REIGHARD.

34. Investigations in Zoögeography. This work may be elected as 34*a*, *two hours credit;* 34*b*, *three hours;* 34*c*, *five hours;* 34*d*, *ten hours.* Professor RUTHVEN.

36. Investigations in Entomology and on Oligochaeta. This work may be elected as 36*a*, *two hours credit;* 36*b*, *three hours;* 36*c*, *five hours;* 36*d*, *ten hours.* Assistant Professor WELCH.

38. Investigations in Genetics. This work may be elected as 38*a*, *two hours credit;* 38*b*; *three hours;* 38*c*, *five hours;* 38*d*, *ten hours.* Professor SHULL.

40. Investigations in General Physiology. This work may be elected as 40*a*, *two hours credit;* 40*b*, *three hours;* 40*c*, *five hours;* 40*d*, *ten hours.* Dr. HEILBRUNN.

42. Investigations in Helminthology. This work may be elected as 42*a*, *two hours credit;* 42*b*, *three hours;* 42*c*, *five hours;* 42*d*, *ten hours.* Assistant Professor LA RUE.

SUMMER SESSION OF 1921

1. Principles of Animal Biology. *Four hours credit.* Professor SHULL, and Mr. CHICKERING.

2. Organic Evolution. *Two hours credit.* Professor REIGHARD.

3*a*. Heredity. *Two hours credit.* Professor SHULL.

9*a*. Embryology of Vertebrates. *Four hours credit.* Mr. CHICKERING.

25. Advanced Zoölogical Studies. *Credit to be arranged.* Professors REIGHARD and SHULL.

For the description of the courses in Zoölogy and Botany to be given at the Biological Station at Douglas Lake, Cheboygan County, see chapter on Summer Session.

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Colleges of Engineering and Architecture

Special Announcements giving further information in regard to these Colleges are published annually. For copies of these Announcements or for further information relating to the Colleges, address Professor Louis A. Hopkins, Secretary, Ann Arbor, Mich.

In the legislative act under which the University was organized in 1837, provision was made for instruction in engineering and architecture. Work was not actually begun in engineering, however, until 1858, and the first degrees were conferred in 1860. The engineering courses were included in the curriculum of the College of Literature, Science, and the Arts, until the close of the collegiate year, 1894-1895. At that time the College (Department) of Engineering was established by the Board of Regents as a separate College of the University. Instruction in architecture was organized in a sub-department of the College of Engineering in 1906. In 1913 the College of Architecture was given control of its programs of study, and, in general, charged with the administration of its affairs.

The Colleges of Engineering and Architecture offer a group of four-year curricula leading to the bachelor's degree. The degree conferred upon completion of one of these curricula is Bachelor of Science in Engineering, or Bachelor of Science in Architecture. The requirements for these degrees will be found on pages 409 and 455.

The academic year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922. In addition to four academic years, attendance at a Summer Session of eight weeks, beginning the Monday after Commencement (July 5, 1921, to August 26, 1921) is required between the second and third years of residence for all students in the College of Engineering except those in Civil Engineering; and between the third and fourth years for students in Civil Engineering. In addition to four academic years of residence, students in the College of Architecture are required to work four months in an architect's office.

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REQUIREMENTS FOR ADMISSION

The requirements for admission are the same for all students in Engineering and Architecture.

Applicants for admission must be at least sixteen years of age, and must present satisfactory evidence of good moral character. They must bring credentials from the preparatory school last attended.

Applicants may be admitted on diploma, by examination, or on credits from another college. Advanced credit may be allowed for work done in other institutions, provided the applicant's record shows that such work is equivalent to some course or courses offered in the University of Michigan. Provision is also made for the admission of special students under certain conditions.

ADMISSION OF CANDIDATES FOR A DEGREE

Candidates for admission as regular undergraduate students must pass examinations in fifteen units as indicated below or must be recommended by an accredited preparatory school as graduates who have satisfactorily completed these requirements for admission. Students who otherwise meet the above requirements but are deficient in not more than one and one-half units, may be admitted conditionally, but must make up their deficiencies within one year. These requirements are stated in units, a unit being defined as a course covering an academic year that shall include in the aggregate not less than the equivalent of one hundred and twenty sixty-minute hours of classroom work. Two hours of laboratory, drawing, or shop work are counted as equivalent to one of recitation.

Prescribed Units for Admission

GROUP I. ABSOLUTE REQUIREMENTS—10 UNITS

English ..... 3 units
Grammar, Composition, Classics, History of English Literature.
Mathematics ..... 3 units
Algebra, through quadratics, Geometry, Plane, Solid, Spherical.
Physics ..... 1 unit
History ..... 1 unit
Greek, Latin, German, French, Spanish—One of these..... 2 units

GROUP II. ALTERNATIVE REQUIREMENTS—1½ OR 2 UNITS

Chemistry ..... 1 unit
Trigonometry, Plane ..... ½ unit
German, French or Spanish ..... 1 or 2 units
Greek or Latin ..... 1 or 2 units
Manual Training ..... 1 unit

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GROUP III. OPTIONAL REQUIREMENTS—3½ OR 3 UNITS

The 3 or 3½ optional units may be presented in any subjects for which credit toward graduation is given by the accredited school and which are taught in a manner approved by the University; but no more than three of the fifteen units required for admission will be accepted in vocational subjects and no more than two units in any one of them. Students of Architecture should, if possible, offer one unit of free-hand drawing.

The Manual Training must be of such a character as to excuse the student from Shop 1 and 2 in the University. Students who present the full requirements for admission without Chemistry or Trigonometry, will take a two-hour course in Trigonometry and two four-hour courses in Chemistry during their first year of residence, receiving credit for the same toward graduation.

All applicants must send prospectuses of the courses of study or letters from instructors describing the work done when credit is asked in the vocational subjects,—Manual Training, Drawing, Agriculture, and Commercial Branches. In general, the standards set up by the Commission on Accredited Schools and Colleges of the North Central Association of Colleges and Secondary Schools will be recognized in adjusting high-school credits in vocational studies.

Chemistry and Plane Trigonometry are placed in an alternate group with German, French, Spanish, Latin, Greek, and Manual Training, so that all high schools with three or more teachers may offer full preparation for the Colleges of Engineering and Architecture, even if they cannot teach Chemistry and Trigonometry. These courses are offered in the Summer Session to accommodate students who wish instruction in them before entering the Colleges.

Some modifications of the language requirements may be allowed in the case of students whose native tongue is other than English. These cases will be considered individually.

Under English is included Grammar, Composition, Reading of English Classics, and History of English Literature. The History of English Literature may form part of the work of either the third or fourth year. Four units in English should always be presented whenever it is possible to do so.

Language Requirement for Graduation

All regular students in the College of Engineering are required to complete the equivalent of Course 4 in French or German; in the College of Architecture they are required to complete the equivalent of Course 3 in French or German, as given in these Colleges. Course 2 in Spanish, when preceded by at least three years of Latin or Greek or Course 3 in Spanish when preceded by two years of Latin or Greek, will satisfy this modern language requirement. If the engineering student meets this requirement with less than sixteen hours of college credit, or the architectural student with less than

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twelve hours of college credit, he must substitute for the balance courses from the following list:—English, Foreign Languages, Oratory, History, Political Science, Political Economy, Sociology, Philosophy, Fine Arts, Music.

ADMISSION ON DIPLOMA

Students presenting graduating certificates from any of the schools officially approved by the Committee on Diploma Schools, are admitted without examination to the Colleges of Engineering and Architecture, if they are recommended by the principal of the school in the subjects required as units for admission. Students must have done their work in mathematics and physics recently enough to have these subjects thoroughly in mind, if they are to enter and do the work required in either College. These studies may be reviewed in the Summer Session, July 5 to August 26, 1921. College credit may be given for studies presented in excess of fifteen units required for admission, if these studies are deemed equivalent to similar courses in the University. Such credit will be adjusted after consultation with the professor in charge of the department concerned.

The approved schools of the University of Michigan do not necessarily include all of those accredited to or affiliated with other universities or colleges.

Diplomas and seventy-two-count academic certificates issued by the Regents of the University of the State of New York are accepted by the College of Engineering and Architecture in place of examinations in all the subjects required for entrance which are covered by such credentials. A statement from the teacher, giving in detail the work done and proficiency attained in these subjects, must be submitted by the holder of the credentials.

A student who has failed to secure a certificate of graduation and the principal's recommendation from an approved school will be required to pass the regular examination for entrance in all subjects.

Students who desire to enter the College of Engineering should present their credentials at the office of the Assistant Dean, Room 255, Engineering Building, not later than September 19, 1921, if they intend to enter for the first semester, and not later than February 10, 1922, if they intend to enter for the second semester. Students who desire to enter the College of Architecture should present their credentials on or before these dates to the Professor of Architecture, Room 209, of the same building.

It is better to mail the credentials to the proper office as long before these dates as practicable. They will be examined, placed on file, and the applicants will be informed whether they satisfy the requirements or not. Certificates and diplomas from schools other than those officially approved by the University do not excuse an applicant from the admission examinations.

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ADMISSION ON EXAMINATION

Examinations for admission are held in September and in February. These examinations are conducted by the College of Literature, Science, and the Arts, in accordance with the schedule on page 132. Applicants presenting themselves too late for the scheduled examinations are required to pay an examination fee of *five dollars.*

SCOPE OF THE PREPARATORY WORK

In English Language, English Literature, French, German, Greek, Latin, Physics, Chemistry, History, Physiography, Botany, and Zoölogy the amount and character of the work which will be accepted is identical with that described for the College of Literature, Science, and the Arts.

Mathematics.—The three and one-half units in mathematics include Algebra, Geometry, and Trigonometry, as follows: *Algebra.*—Fundamental Rules, Fractions, Simple Equations, Involution and Evolution, the Theory of Exponents, and Quadratic Equations, as given in Beman and Smith's Elements of Algebra, or an equivalent in other authors. *Geometry.*—Plane, Solid, and Spherical Geometry as given in Beman and Smith's Plane and Solid Geometry, or an equivalent in other authors. *Trigonometry.*—Plane Trigonometry, as given in Hall and Frink's Trigonometry, or an equivalent in other authors.

N. B.—It is very desirable that high schools whose graduates are received on diploma arrange their courses so as to include a portion of both Algebra and Geometry in their last preparatory year. Students who do not come from diploma schools should take a similar review if they expect to succeed in the study of mathematics in the University.

Spanish.—In addition to a thorough study of the Spanish grammar such as is presented in such a work as Wagner's Spanish Grammar, the student should have read considerable modern Spanish and be able to read at sight easy prose. The preparatory course should include daily practice in conversation.

Drawing.—Where the full two units are offered for admission, the work may consist of free-hand drawing, mechanical drawing, and design, a combination of any two of these, or it may consist entirely of any one of the three. Each one-half unit offered must represent work extending through the equivalent of two forty-five minute periods per day for one-half year.

The work to be covered in the first half unit allowed is stated below. To receive the additional one-half, one, or one and one-half units the work must be relatively more advanced and the student must present a separate outline of each course taken together with the drawings made.

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Free-Hand Drawing.—The student should show that he can represent correctly in outline and in light and shade, geometric and simple natural or decorative form. Accuracy of proportion and perspective are essential. The pencil, charcoal, or brush may be used.

Mechanical Drawing.—This work should cover:

(a) Exercises giving evidence of skill in the use of instruments and knowledge of materials used. These should consist mainly of the accurate geometrical construction of the more important plane curves, with simple problems involving tangents and normals to the same.

(b) Graded exercises in the orthographic projections of simple geometrical forms and working drawings of some of the more elementary constructions in wood and metal, all fully dimensioned, and in which the conventional signs are properly used.

(c) Exercises in line shading, shade lining, and cross hatching, together with a reasonable skill in lettering.

Design.—In this work a student should show some knowledge of the principles of design and the ability to apply them. The exercises should consist of compositions of straight and free curved lines and simple shapes and their use in the design of simple objects, such as a book cover, etc. The exercises may be in black and white, various values, or in color, and may consist in part of objects in wood or metal, and the like.

Manual Training in Shop Work.—One unit, optionally prescribed. The work to be accepted for this unit must cover bench work in wood, wood turning, and simple pattern making; forging, chipping, and filing; elementary machine shop work.

Two units, allowed. In making up the two units allowed, not more than one unit will be accepted in wood work, wood turning, and pattern making; one unit in machine shop work; one-half unit in forge shop work; one-half unit in foundry.

Agricultural and Commercial Branches.—In general the requirement for a unit in Agriculture or in Commercial Branches involves the completion of a course taken at least five hours per week for one year and accepted for graduation in the high school. The extent and character of the work must be approved by the University Inspector.

CONDITIONAL ADMISSION

An applicant who is deficient in not more than one and one-half units, may, at the discretion of the Faculty, be admitted conditionally; but he must remove any condition thus incurred at one of the next two regular examinations for admission; no student who has an admission condition outstanding at the beginning of his second year of residence is allowed to enter his classes until such condition is removed, unless for valid reason an extension of time is granted for its removal.

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ADMISSION ON CREDITS FROM ANOTHER COLLEGE

Applicants who have taken some portion of the studies required for admission in an approved school or college—not a high school—may receive credit for such work in place of taking examination in the same. The following documents must be presented:

a. An official copy of their credits showing the subjects studied in such school or college, the number of weeks devoted to each, the number of class periods per week, and the standard attained upon completing the same.

b. An official certificate of their regular admission to such school or college.

c. An official certificate of honorable dismissal from such school or college.

Applicants in Engineering should apply in person to the Assistant Dean, Room 255, Engineering building, and applicants in Architecture to the Professor of Architecture, Room 209, Engineering building, September 19, or February 10.

ADMISSION TO ADVANCED STANDING

Bachelors of Arts or Science of this University (and graduates of other approved colleges) are admitted without examination to advanced standing as candidates for a degree in Engineering or Architecture.

They should present to the Assistant Dean or to the Professor of Architecture an official certificate of the date of their graduation—not their diploma—and an official copy of the record of the studies they have completed, showing the subjects studied, the number of weeks devoted to each, the number of class periods per week, and the grade attained.

Such students are excused from a considerable portion of the general requirements for graduation (see page 409). The remaining requirements can be completed in two years, if, as an undergraduate, the student has taken the Mathematics and Physics prescribed for Engineering students (see page 409), and Courses 4 and 5 in Drawing (see page 422). A knowledge of differential and integral calculus, analytical mechanics, elementary drawing and descriptive geometry is required for the advanced work.

The culture imparted by classical or other liberal subjects will be found to have its uses for one engaged in technical work and a thorough study of the pure sciences will prepare engineering students for their work in applied sciences. All the time the student can devote to general studies before taking up specialties will be well spent.

Students who have completed at least one year's work in an approved college, and who bring explicit and official certificates describing their course of study and scholarship, and testifying to their good character, are admitted to advanced standing without

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examination except such as may be necessary to determine what credit they are to receive for work done in the college from which they have come.

Such applicants should present a letter of honorable dismissal from college; an official copy of their college record; and an official record of their high school, or other work, preparatory for college, the same as those admitted on diploma.

Students who have not completed a year's college work in an approved college, but before entering these Colleges of the University have pursued studies beyond those required for admission, may be admitted to advanced standing on passing the regular entrance examinations, and examinations in such undergraduate studies as they may ask to be credited with in advance.

Work in Manual Training and Drawing, pursued in a high school, is recognized for advanced credit if considered by the instructors in the Colleges of Engineering or Architecture equivalent to the work given in this University. Students desiring advanced standing in Drawing must bring all drawings completed previous to entrance.

Advanced credits must be secured before the student is classified and the record at once placed on file in the Secretary's office. An account once closed cannot be reopened without special permission from the Assistant Dean or the Professor of Architecture.

ADMISSION OF STUDENTS NOT CANDIDATES FOR A DEGREE

Students who are pursuing work in these Colleges and are not candidates for a degree, are designated Special Students.

Students over twenty-one years of age who wish to pursue particular studies in either College and who show by examinations or by the presentation of satisfactory certificates that they are prepared to do good work in the selected courses, may be admitted as special students on the recommendation of the heads of the departments of instruction in which they wish to study. The object of this rule is to enable young men who are beyond the high school age to secure technical training along special lines when they are properly prepared for the work. Two or more years of successful experience as teacher, draftsman, surveyor, engineer, or operative in engineering works, will be given considerable weight in determining the fitness of the candidate. In general, a good working knowledge of English, algebra, and geometry is required in order to succeed in engineering studies. Applicants for admission as special students should send as early as possible to the head of the department concerned letters of the courses desired.

A two-year course is provided for special students in Architecture. Such students must be qualified for the courses they wish to pursue and must have the approval of the Professor of Architecture.

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They must be twenty-one years of age, must have had two or more years of experience in architects' offices, and must have a practical knowledge of architectural drawing. Special students who wish to pursue courses in advanced building construction, must present the regular entrance requirements in mathematics.

Special students pay the same fees as regular students. Their work is assigned and regulated by the heads of the departments of instruction in which they register.

A special student may become a candidate for a degree by fulfilling the regular requirements for admission.

A student who is a candidate for a degree cannot become a special student without the permission of the faculty concerned.

DIRECTIONS

Applicants for admission on examination should present their credentials to the Assistant Dean of the College of Engineering, Room 255, in the Engineering building, or to the Professor of Architecture, Room 209, Engineering building, on Monday, September 19, between the hours of 9 and 5, and receive from him papers admitting to the examinations. The result of the examination may be learned at the office of the Secretary, Monday, September 26, 1921.

Applicants for admission on diploma should present their recommendation blanks to the Assistant Dean or the Professor of Architecture not later than September 26, 1921.

When admitted, each student will be furnished with directions for subsequent procedure.

WITHDRAWAL FROM THE COLLEGE

Before withdrawal from class work, even temporarily, students should report to the Assistant Dean or the Professor of Architecture.

Honorable Dismissal will be granted by the Assistant Dean or the Professor of Architecture to students in good standing who present written requests from parent or guardian.

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities, see Catalogue, page 101.

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SOCIETIES

Several organizations of students are maintained, aside from the usual literary societies, for the reading of papers and holding discussions in various scientific lines.

The Engineering Society, composed of and conducted by students of this College, holds meetings, at which papers of technical interest are read, and reports made upon observations and experiments. A reading room is maintained by the society, accessible to all students of the College. Many engineers of prominence have spoken before the society in past years.

The Architectural Society holds meetings from time to time for hearing addresses by visiting or local speakers, and gives a number of social functions.

GRADUATE COURSES

The administration of courses for graduates is in the hands of the Graduate School, under which heading their description will be found. It should be emphasized here, however, that the world is constantly setting higher standards for engineers and architects, and that it is already distinctly advantageous for all students to lay a broad foundation of general courses during their four years of undergraduate work and reserve specialization for a fifth year. The group system of electives described below allows the proper freedom of election on the part of those planning to return for graduate work.

The following degrees are conferred: Master of Science in Engineering or Architecture, Civil Engineer, Mechanical Engineer, Electrical Engineer, Chemical Engineer, Marine Engineer, Aeronautical Engineer, Naval Architect, and Architect.

For details, see the chapter on the Graduate School or write to Dean ALFRED H. LLOYD, for the special announcement of that School.

COURSES OF INSTRUCTION

These courses of instruction are subject to change from time to time; those announced for the year 1920-1921 and required for graduation, as stated on pages 410 to 451, together with some advanced, elective, and technical courses, are described on the following pages.

The courses given in the College of Literature, Science, and the Arts, and described on pages 177 to 378, are all open as electives to Engineering and Architectural students who are qualified to pursue them with advantage. Students desiring to elect such courses must receive permission from the Dean of that College and from the Com-

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mittee on Classification of the College of Engineering, or from the Professor of Architecture.

A student enrolled in the College of Literature, Science, and the Arts, who desires to elect any of the work in the Colleges of Engineering and Architecture not included in the courses offered in the former College, must obtain written permission from the Dean of his College.

FEES AND EXPENSES

See the supplement sheet for important changes in fees.

The Matriculation Fee and the Annual Fee must be paid in advance. For the rules governing Second Semester fees and the refund of fees see page 117.

MATRICULATION FEES.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *ninety-five dollars* for men, *ninety-one dollars* for women; for students not residents of Michigan, *one hundred twenty dollars* for men, *one hundred sixteen dollars* for women. These fees covers class instruction, use of libraries, outdoor physical education and admission to all athletic events on Ferry Field, membership in the Michigan Union or Woman's League, as well as medical attention from the University health service and dispensary.

GRADUATION FEE.—The fee for graduation is *ten dollars,* and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the Graduation Fee. This fee will be received by the Treasurer of the University upon the presentation of a ticket to be secured at the office of the Secretary of the College in which the candidate is enrolled. To receive a degree at Commencement the candidate must be present in person and must have paid the graduation fee at least twenty-five days prior to Commencement Day. Others who have satisfied all the requirements for graduation, including the payment of the graduation fee, will receive their degrees at a subsequent meeting of the Board of Regents.

LABORATORY FEES.—The laboratory fees are included in the annual fee, but students in laboratory courses in chemistry must make a cash deposit to pay for materials used and for breakage. *Camp Fee.*—A fee of *ten dollars,* in addition to the regular tuition for the Summer Session, is required of students who take Course 3 in Surveying.

The fee required for any course must be paid before the work of the course is begun.

TOTAL FEES.—The total amount of fees paid to the University during the whole four years' course for matriculation, incidental expenses, materials used, and graduation, is, for Michigan students, $400; and for others, $515.

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OTHER EXPENSES.—There are no dormitories for men, and no commons connected with the University. Students obtain board and lodging in private families. Room rent varies from four to six dollars a week for each student. Board varies from seven to eight dollars a week.

ANNUAL EXPENSES.—The annual expenses of students, including clothing and incidentals, are, *on the average*, about seven hundred dollars. By the practice of strict economy, it is possible to complete the four-year course for twenty-two hundred dollars, and even less. Many students are enabled to complete their course by withdrawing for a year or two to earn money to carry them through the remaining years.

A set of drawing instruments costs about $20.00, and, if well selected will be serviceable for many years.

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COLLEGE OF ENGINEERING

FACILITIES FOR INSTRUCTION

The chief requirement for a successful school of engineering is recognized to be a teaching staff organized by the selection of men who have not only had a thorough technical training but who have engaged for a considerable period in the practice of the particular branch of engineering which they teach. A large number of men have accordingly been selected, who have been engaged in practice for many years.

The work of instruction offered by these men is supplemented by illustrative material of various kinds. Large collections of photographs, drawings, working drawings, blue prints, models, working models, and full sized machines have been made and are freely used. These collections are being added to largely from year to year by gift and purchase, and are invaluable to the student.

The College occupies seven buildings on the campus, and a portion of the New Chemistry building is given over to the work in Chemical Engineering. The Engineering building occupies a ground space equivalent to 60 ft. by 650 ft., and is a fireproof structure four stories high. The Old Engineering building is used by the college for the work in English and Modern Languages. The shops occupy the old mechanical laboratory building and the surveying department is temporarily housed in the Natural Science building.

PHYSICAL LABORATORY

For description of the Physical Laboratory, see page 68.

CHEMICAL LABORATORY

For description of the Chemical Laboratory, see page 69.

ASTRONOMICAL OBSERVATORY

For description of the Astronomical Observatory, see page 61.

ENGINEERING SHOPS

The engineering shops are in a group of connected buildings, and occupy about 30,000 square feet of floor space. Electric power is used throughout.

The *Wood and Pattern Shop*, 40 by 127 feet, is equipped with the tools and machinery usually found in a first-class establishment.

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One end of the shop contains work-benches and tools needed for hand work in wood. The other end contains benches and tools specially adapted for pattern making. The central portion is occupied by a good variety of wood-working machinery. A lumber and pattern loft, 40 by 120 feet, contains blue-printing apparatus, material, and a large collection of patterns.

The *Foundry*, 30 by 120 feet, is equipped with melting furnaces for cast iron and non-ferrous metals, core ovens, elevator, crane, blowers, molding machines, small tools, and other equipment for a large variety of foundry work. A storage building contains flasks and miscellaneous bulky equipment. Castings are made weekly, aggregating 40 to 50 tons annually.

The *Forge Shop*, 40 by 127 feet, contains 28 down draft forges with anvils and tools for hand forging, equipment for bench work in metals, a large punching and shearing machine, a power hammer, and other special forging equipment, lathes, drills, planers, and grinders for elementary machine shop work, furnaces and other equipment for the heat treatment of steels, an oxy-acetylene welding outfit, and a large electric driven fan for supplying blast to fires and for ventilation. The complete equipment is used for instruction in the fundamental principles and processes of metal working.

The *Machine Shop*, 40 by 127 feet, contains one or more of each of the principal types of machine tools now in general use. These comprise engine lathes, turret lathes, speed lathes, planers, shapers, drilling, milling, and grinding machines, and others of more special types. These comprise a total of 48 power driven machines. In addition there are portable electric tools, compressed air equipment, and machines and devices operated by hand. An ample equipment of small tools for machine and hand use is maintained in a well organized tool room. The whole is used for instruction in the fundamental processes of machine construction.

In connection with each of these four shops there is a recitation room, in which are collected models, drawings, charts, diagrams, and books, which are used in the courses of instruction.

The central portion of the building 32 by 54 feet contains lockers and lavatories in the basement, offices and instrument shop.

The instrument shop is provided with machinery and tools for making apparatus and instruments for the laboratories of the University.

A good part of the equipment has been designed and built in the shops. New machinery is added from time to time by construction or purchase. The entire equipment is used in instructing engineering and other students in the use of tools for working in wood and in metals, and in modern workship methods. Opportunity is afforded to become familiar with the more common materials and forms of construction used in engineering structures, buildings, and machinery. In all work an effort is made to follow the practice of the best shops.

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CAMP DAVIS

Through the generosity of Colonel Charles Bogardus and his wife, Hanna W. Bogardus, and by subsequent purchase, the University has acquired a tract of land embracing about 3,200 acres, lying on the south shore of Douglas Lake, Cheboygan County, Michigan. These lands, known as the Bogardus Trace, have a frontage of about three miles on Douglas Lake. The Surveying Camp (Camp Davis) is located on the southern and eastern shore of Douglas Lake, or on the south shore of South Fishtail Bay. The University lands extend from Douglas Lake to Burt Lake, one and three-quarters miles to the south. The frontage on the latter lake is considerably over a mile. Burt Lake has an elevation of 118 feet less than that of Douglas Lake. The lands bordering Burt Lake contain many springs, some of which unite to form a small stream known as Carp Creek. The summer work in surveying was conducted at this site for the first time during July and August of 1909. The camp grounds and the lands generally have improved each year. Each class has left some monument of its activity within the limits of the camp proper. To date the students have built or aided in the construction of the following improvements: A harbor for boats; two concrete buildings, each fifteen by thirty feet in plan; a water system, including wells, a reservoir and distributing system; a concrete platform, twenty by thirty feet, for adjusting instruments and for similar exercises; thirteen steel buildings to replace tents; two piers for sextant work; a gravel road through the camp; walks and stairways; triangulation stations and concrete piers for indicating the location of a camp meridian and for determining the center of the camp,—the main street being laid out in the arc of a circle. During the summer of 1915 a number of students from the University were employed to install a complete sanitary system, including standard fixtures, a sewer, and septic tank. At the same time a new kitchen with a basement twenty-eight feet square, was completed. During the summer of 1916, seventeen steel residence buildings were erected. Ten steel residence buildings and an instrument room were added in 1917, and ten additional residence buildings were erected in 1919. While the prescribed work in surveying (page 450), occupies much of the time of the students, yet they have opportunities to take part in many activities which are valuable in themselves. Students publish a camp paper; they enforce sanitary regulations; they organize parties for participation in construction work; they aid in entertaining visitors and participate in athletic activities. By thorough organization in every department all become quickly acquainted with the duties that must be performed. The resulting spirit of kindly cooperation and loyalty cannot be exceeded anywhere.

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MECHANICAL ENGINEERING LABORATORY

The Mechanical Engineering laboratory is located in the Engineering building and occupies a total floor space of some 13,000 sq. ft. The laboratory as a whole comprises all the equipment utilized for illustration of the theory involved in Mechanical Engineering and for research experimental work. Separate laboratory instruction is given along the lines of Hydraulic machinery and Automobiles and those parts of the equipment applying especially to these divisions are segregated to form the Hydraulic laboratory and the Automobile laboratory of which special mention is made below.

The equipment of the general Mechanical Engineering laboratory consists of steam power machinery and apparatus; internal combustion engines; air compressors; refrigeration machinery; and heating and ventilating apparatus; as well as the auxiliary apparatus for use in testing the various machines. Among the most interesting of the machines may be mentioned a 25 KW Curtis steam turbine; a 20 KW DeLaval steam turbine; several steam engines varying from 10 to 150 H. P.; a 40 H. P. Stirling boiler; two high-pressure air compressors delivering air at 2,600 pounds per sq. in.; a 13-ton ice-making plant complete in every respect; a Sirocco fan of latest type; and a complete experimental fan-heating system. In addition to the laboratory equipment, the University heating and lighting plant is available for experimental work as are also the plants of the city water company.

Besides the larger machinery the laboratory is equipped with all the necessary and desirable instruments used in testing, such as engine indicators, indicating and recording gages, thermometers, pyrometers, flow meters, weighing apparatus, etc. The instrument room also contains the standards for calibrating and correcting the various instruments. The laboratory is further equipped with apparatus for use in fuel calorimetry and analysis, and oil testing, suitable to the needs of the mechanical engineer.

While by far the greatest part of the equipment of the laboratory is devoted to the standard tests required in the regular work, there is nevertheless a large amount of special apparatus developed for the solution of specific problems.

Hydraulic Laboratory.—This laboratory occupies a space of 40 x 60 ft. on two floors. A canal 4 ft. wide and 14 ft. 6 in. deep conveys water from the naval tank to a well which furnishes the suction supply for the pumps. A 15-inch centrifugal pump geared to a 150 H. P. variable speed motor returns the water through two weighing tanks, each holding 600 cu. ft., to the naval tank. The canal is provided with bulk heads, screens, wiers, and nozzles arranged for various kinds of tests. The naval tank itself is arranged with bulk heads dividing it into basins each 100 feet long, and by means of a sluice in the bottom, connecting with the canal, various ar-

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rangements for pumping can be made. Other pieces of apparatus of special interest are a one million gallon duplex pump, a tangential water wheel direct connected to a 100 KW Fairbanks-Morse alternator with excitor and switchboard, a large Francis water wheel, and a number of smaller pumps and water wheels.

Besides the above equipment, the two Rees Roturbo pumps of the University fire protection system are installed in the Hydraulic laboratory, each pump being driven by a 150 H. P. variable speed induction motor. These pumps are arranged for use in experimental work.

Automobile Laboratory.—The Automobile laboratory consists of an engine testing section, a research room, and a section for demonstration of automobiles, motor trucks, and their component parts. The equipment of the engine testing and demonstrating section includes some twenty automobile, truck, tractor, and aeroplane engines of two, four, six, eight, or twelve cylinders; complete operating and cutout chasses, transmissions, rear axles, differentials, clutches, carburetors, ignition, starting and lighting systems, and other automobile equipment. In the dynamometer room there is available for research purposes a 60 H. P. Diehle Electric Dynamometer and a 100 H. P. Sprague Electric Dynamometer, together with special fuel measuring devices, tachometers, pyrometers, venturi meters, manograph, and accessories necessary for accurate, advanced testing and research investigation, of both engine and chassis.

PHYSICAL TESTING LABORATORY

The Physical Testing Laboratory occupies two adjoining rooms, 29 x 54 feet and 27 x 54 feet respectively, on the ground floor of the south wing of the Engineering building and is equipped with apparatus especially designed for testing the strength of materials used in engineering work. This equipment includes a 50,000 pound capacity Riehlé tension and compression machine, a 100,000 pound Olsen testing machine, and a Riehlé tension and compression machine of 200,000 pounds capacity. Both these machines are adapted to tensile, compressive, and transverse tests, and are run by direct-connected motors. An Olsen torsion machine of 240,000 inch-pounds capacity, also equipped with direct-connected motor, is used in determining the torsional strength of shafts and axles. Impact tests are made on an Olsen machine and endurance tests on an Upton Lewis Toughness machine. The cement testing laboratory is equipped for making the ordinary tests of cement and concrete. In addition to scales, sieves, briquet molds and accessories, there are two briquet testing machines made by Olsen, and a uniform-load beam-testing machine, especially designed for the University of Michigan, with a capacity of 85 tons, and adapted to beams of reinforced concrete, wood, or steel of any span up to 12 feet.

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THE HIGHWAY LABORATORY

The Highway Laboratory is located in the north half of the old campus power house, occupying approximately 6,000 square feet of floor space. There are six laboratory rooms besides a computing room, an instrument room, and offices. The equipment throughout is modern and up to date. Tests are made in this laboratory on all materials used in road or pavement construction. There is a completely equipped laboratory for the testing of rock used in the wearing surfaces of roads, equipment for the study of sand-clay mixtures, a completely equipped cement testing laboratory, including all the equipment necessary for the study of all concrete aggregates, a standard rattler for the testing of paving brick, and a bituminous laboratory for carrying out tests on road oils, tars, asphalts, and for analyzing wearing surfaces using bituminous cements. In the basement of the laboratory there is an Olsen compression machine of 200,000 pounds capacity and a large machine of 200 tons capacity for testing beams, columns, and floors of different types used in the construction of highway bridges. Full sized bridge members can be tested on this machine. The laboratory is also equipped with a paving determinator for the wearing out of road and pavement surfaces. This machine is used largely in research work concerning the durability of materials and the desirability of methods of construction.

The Highway Laboratory has been placed by the Board of Regents at the service of the people of the State of Michigan. Tests on brick, stone, gravel, asphalt, road oils, and other road and paving materials are made for the State of Michigan. The laboratory is being operated in direct co-operation with the State Highway Department of Michigan.

ALEX DOW HYDRAULIC EXPERIMENTAL FLUME

This flume, for conducting experimental research work in hydraulics, is on the Huron River, about one mile north of the University campus. It is connected with two of the flood gates at the spillway of the Argo Dam, giving a head of about 10 feet and an available water supply of 250 cubic feet per second. The total length of the flume is 138 feet, the upper end being approximately 8 feet wide and 9 feet deep, while the lower end, 102 feet long, is exactly 2 meters (6.56 feet) wide and 8 feet deep. The flume is equipped with two sets of adjustable baffels, one set being vertical and the other set horizontal. There are five tanks connected to different parts of the flume by 2-inch pipes, above which hook gages are placed, the entire installation being enclosed by a suitable gage house. Above the flume at its upper end is a small frame building which contains a complete equipment for measuring water by the salt solution method

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and provides shelter for the men engaged in working up experimental data.

The flume is so arranged that the models to be experimented upon may be easily erected or removed, and the arrangement within the flume may be modified to conform to the requirements of any particular experiments. The salt solution equipment provides for the accurate calibration of standard weirs, which in turn may be used for measuring water for other experimental work. The flume is especially adapted to the determination of empirical coefficients such as occur in formulas of discharge for weirs, gates, orifices, and pipes under a wide range of conditions. The large supply of water makes it possible, in many cases, to conduct experiments on a larger scale than has hitherto been undertaken.

SANITARY EXPERIMENT STATION

The Sanitary Experiment Station comprises two small buildings together with a number of minor structures, and is located on the University grounds near Fuller Street, where the slope of the surface permits of the compact and efficient arrangement of the plant. The purpose of the Station is to provide facilities for the study of various problems related to public sanitation, and particularly to afford opportunities for investigational work in water purification, sewage disposal, the prevention of stream pollution, and other fields of sanitary engineering.

ELECTRICAL ENGINEERING LABORATORIES

The laboratories comprise one very large main dynamo room, six interconnected rooms for the telephone, telegraph, and wireless department, four rooms for photometric work, and one room each for storage battery, instrument calibration, research work, electrical museum, oscillograph work and dark room, instrument room and laboratory repair shop.

The *Continuous Current and Alternating Current Laboratory* is thoroughly equipped with units typical of all the standard types of electrical machinery and of many of the more important special types. Liberal equipment of apparatus and instruments enables the average squad to consist of four men, giving special opportunity for individual instruction and for independence in the work with development of initiative by each man in the squad.

The *Photometric Laboratory* is provided with standard photometers, photometer bars, standard lamps, etc., the equipment for testing arc lamps and for the investigation of illumination of buildings and streets being particularly complete.

The *Telephone and Telegraph Laboratories* are well equipped for the study of telephone and telegraph apparatus of both com-

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mercial and experimental types. The auxiliary apparatus includes ammeters, voltmeters, electrodynamometers, artificial telephone cables, condensers, etc., and is being added to each year. The laboratories are well supplied with commercial apparatus from the principal telephone companies. The Michigan State Telephone Co. operates an exchange for the University and this is available for demonstration purposes.

The *Museum* contains several dynamos of historic interest, including an early generator by Ladd of London, and two by Dr. J. W. Langley, formerly of this University, collections of insulators, cables, and other articles of interest or value for instruction to students in electrical engineering.

The University is well situated for excursions to Detroit and other places where establishments of engineering interest may be visited.

CHEMICAL ENGINEERING LABORATORY

The *Chemical Engineering Laboratory* occupies twenty-five rooms on the first and second floors of the Chemistry building. On the second floor are an office, two private laboratories, a laboratory accommodating four advanced students, and a general laboratory with desks for twenty students and a balance room. On the first floor, aside from private laboratories for instructors and advanced students, there are the following special laboratories:

The *Gas and Fuel Laboratories* occupies a group of four rooms; a general laboratory for gas analysis; a calorimeter room equipped with eight bomb calorimeters of various types, two Parr calorimeters and a Junkers gas calorimeter; an instructor's laboratory; and a laboratory for advanced students.

The *Pyrometer Laboratory* has been lately supplied with a very complete line of equipment for the study of commercial methods of pyrometry. This equipment includes a testing set operating on the wheatstone bridge principle, a precision potentiometer, a portable potentiometer, a student potentiometer, a recording potentiometer, several specimens of commercial pyrometers of the millivolt meter type, two optical pyrometers, and all necessary auxiliary apparatus, such as resistance boxes, galvanometers, shunts, etc. As an ultimate standard the laboratory has a platinum, platinum-rhodium thermocouple which has been recently calibrated by the U. S. Bureau of Standards.

In equipping this laboratory, the aim has been to give students the privilege of calibrating and using the identical instruments which they will be called upon to understand and operate in commercial plants.

For the study of *Portland Cement* there is in the furnace room a small gasoline fired rotary cement kiln which allows an accurate adjustment and determination of the burning temperature. In the cement testing room are sieves, molds, etc., and a Fairbanks-Morse testing machine, and in a room with approximately constant tempera-

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ture is a micrometer for measuring changes in volume of bars of cement after setting. There are two polarising microscopes and equipment for making thin sections of clinker for microscopic examination.

The *Metallographic Laboratory* occupies three rooms adjacent to the pyrometer and the furnace rooms. Polishing lathes and the necessary facilities for treating the polished section before its microscopic examination are abundantly provided. There are five vertical illuminating microscopes, two Sauveur photomicrographic outfits and a most excellent Zeiss apparatus for the same purpose. Oil-fired and electrically heated furnaces are available for heating specimens of metal, and the permanently installed pyrometer allows an accurate observation of cooling curves and recalescence points.

For *Electrometallurgy and Electrochemistry* both direct and alternating current circuits are available over wide ranges in voltage. Direct current is supplied to the laboratory at 220 volts and may be used in as large amounts as 100 amperes. Lower voltages are obtained from a 10 K.W. generator with field separately excited by the 220 volt circuit. By varying this field excitation any desired voltage between 25 and 50 may be obtained. There is also an Edison storage battery of forty cells. Alternating current is supplied at 220 volts and is transformed to such lower voltages as may be needed for electric furnace work by a 10 K.W. transformer especially designed for the work. There is also a one-half K.V.A. variable step-up transformer capable of giving from 10,000 to 40,000 volts together with a rotating rectifying device for changing the high voltage discharge to direct current. This apparatus is available for experiments on the effect of the silent discharge through gases or on particles suspended in gases. The necessary auxiliary apparatus for measuring and controlling these currents is amply provided. Most of the electric furnaces have been made in the laboratory and their repair and construction is a regular part of the work.

For *Clay Testing and Ceramics* there are two ball mills, two mixing machines, a three-foot dry and wet pan, a brick-press, and an adequate number of oil-fired and gas kilns.

For the study of *Petroleum and Motor Fuels,* the standard instruments for making tests on lubricating oils, gasolene, and other petroleum products, are at hand. In addition, special apparatus of a number of different types have been constructed for investigations in this field.

The *Bituminous Paving Materials Laboratory* contains two penetrometers, two Engler and one Scott viscosimeters, a Smith ductility machine, a Forrest extractor, flash-point testers of various patterns, a copper still for tar distillation, flow plates for pitch and the necessary auxiliary apparatus.

Pulp and Paper Laboratory.—The equipment in this laboratory consists of digestors for cooking soda, sulphate, and sulphate pulps; a diaphragm screen; a beating engine; apparatus for testing the con-

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sumption of bleach; a mould for hand-made sheets; a press, burnisher, and trimmer for drying and finishing the sheets; a toluene vapor oven for moisture determinations and a suction sheet machine for making up sheets in color matching and filler retention tests. Apparatus is also at hand for microscopic and chemical analyses of pulps and papers.

Evaporator Experiment Station.—Through the generosity of the Swenson Evaporator Company, of Chicago, there has been established a laboratory for the study of evaporators, the principal representatives of the special apparatus used in the chemical industries. This laboratory is under the control of the Chemical Engineering Department. It is located on the campus, and occupies a space 65 by 35 feet, with about 30 feet of head room. It is equipped with three types of evaporators, the necessary condensers, pumps, and other accessories. The evaporators are full-sized commercial machines, capable of evaporating up to 4,000 lbs. of water per hour in each machine. They are especially designed for research and experimental work. Other types of equipment such as filters, crystallizers, etc., as used in the chemical industries, are being added from time to time. Advanced research courses are offered in this laboratory for graduate students.

MARINE AND AERONAUTICAL ENGINEERING LABORATORY

The *Experimental or Naval Tank* is a unique feature of the College of Engineering. The object of the tank is to enable experiments of all kinds, including resistance, propulsion, steering, etc., to be made upon models of shops and propellers. The tank occupies one side of the ground floor of the Engineering building, and is 300 feet long, 22 feet wide, with a depth of water of 10 feet. By means of a false bottom, which can be set in varying positions, the depth of the water can be changed so that experiments on the effect which shallow water has upon the speed of vessels may be performed.

The tank is spanned by a traveling truck which can be driven at any desired speed. Upon this truck are mounted the necessary dynamometers to which the ship models are attached and which measure the resistance at any speed.

Adjoining the tank is the work shop where the ship models are made. The size of the models used runs from ten to twelve feet in length, and they are usually made of paraffin wax. A clay mould is first made approximately to the shape desired and a canvas core inserted. Melted paraffin is then poured into the mould, and, after cooling, the rough model is transferred to a specially designed cutting machine. This consists essentially of two moving tables or platforms upon one of which is placed the rough model and upon the other the drawing of the lines of the vessel which it is desired to reproduce. The model moves under a pair of revolving cutters which are

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made to follow the lines upon the drawing. After cutting, the model is finally faced up by hand, carefully checked and weighed, and sufficient ballast added when it is placed in the water, to bring it to the desired draft, and displacement.

The power required to drive a full-sized vessel may easily be determined from the model experiment; and systematic investigations upon various forms of vessels, are continuously performed.

The tank is also used for testing and calibrating current meters.

For students taking aeronautical courses, facilities are provided in various laboratories of the Engineering College for special investigations of strength of materials, parts of air craft structure, motor testing, comparative study of resistances of bodies in the Naval Tank, as well as study of aerodynamical properties of various bodies in an air current 3 x 3 ft., velocity 40 miles per hour, provided by an air blower, in connection with which is a dynamometer newly constructed by the department. The dynamometer is of a type enabling a simultaneous determination of lift, drag, and center of pressure of the body inserted.

USE OF LABORATORIES FOR PUBLIC SERVICE

In 1913, the Regents placed the Highway Laboratory at the service of the cities, villages, counties, and highway officers of the State, for the testing of brick, stone, gravel, and other highway materials without charge other than the expense of shipment of samples. Tests are now being made of road materials and full records are being kept of this work.

Tests of sewer pipe, tile, and other classes of construction material may also be made for municipalities in the Civil Engineering Laboratories.

When practicable, tests of engines and boilers, and of machinery in general are made upon request and by special arrangement as to terms.

Tests of materials are also conducted for private individuals and reported upon when desired. The data of all experiments and tests made are kept in the laboratory records.

All the laboratory work is upon a practical basis and is done as nearly as possible as it would be done in any well arranged manufacturing establishment.

OTHER LABORATORIES, LIBRARIES, AND MUSEUMS

For description of other University laboratories, libraries, and collections for the study of art, archæology, ethnology, mineralogy, geology, paleontology, zoölogy, etc., and for general information concerning the University, see pages 59 to 77.

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VISITS OF INSPECTION

The educational value of visits of inspection is well recognized and inspection trips are regularly made in connection with many of the courses. The wonderful industrial growth of Detroit and Toledo during the last decade has made those cities centers where large and modern illustrations of almost all types of engineering structures and processes may be seen. Inspection trips are regularly made by all second year Engineering students in connection with their course in Materials of Construction. Smaller parties of more advanced students visit places of especial professional interest. Trips of several days' duration are made during the Spring recess.

THE MENTOR AND ASSEMBLY SYSTEM

When the student enters the College of Engineering he is at once assigned to a mentor, or faculty adviser, and students thus assigned are to continue with the same mentor throughout their college course. This mentor is not appointed merely to advise the student with respect to his studies but to take the place of an elder brother on the faculty to whom the student may go and talk over freely any phase of his college life. To help the mentor advise each student in his group with regard to his studies a card system of reports is used which gives each mentor each student's grades six weeks after the beginning of the semester and four weeks before the final examination.

Every week all freshmen in the College of Engineering are brought together in the Freshman Assembly. Here they listen to a talk by the Dean, or some speaker secured by him, and have their class meeting. The Sophomore, the Junior, and the Senior Assemblies meet four times a semester and are regarded as invaluable not only to the mentor system but for purposes of class organization.

THE HONOR SYSTEM

The students of the College of Engineering have adopted the following system: All examinations and written quizzes in the College are held under the Honor System, the object of which is to create a standard of honor which is essential to a successful engineer and a good citizen. Students are expected to uphold the system or declare their objections to it, after having been duly instructed in all the rules governing the system. The instructor does not remain in the room during an examination. The students are placed upon their honor to refrain from all forms of cheating and to reprimand a fellow student who acts suspiciously, and, in case he does not take heed, to report him to the Honor Committee, which consists of one student elected annually from each class in the College of Engineering, and one from the College of Architecture, each member to serve two years.

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Every student is requested to write and sign the following at the end of his examination paper:

"I have neither received nor given aid during this examination."

WOMEN STUDENTS

All questions relating to the living conditions of undergraduate women students enrolled in the College of Engineering and Architecture come under the jurisdiction of the Dean of Women of the University. Matters of scholarship and attendance are handled by Assistant Dean Butts for Engineering, and Professor Lorch for Architecture. Assistant Secretary Green acts as mentor for the women in Engineering and Architecture.

Applications for rooms should be made to Dean Myra B. Jordan, who has entire charge of the matter of housing conditions of the women students of the University.

THE GROUP SYSTEM OF ELECTIVE STUDIES

In July, 1912, there went into effect a complete revision of all the programs in Engineering, by which it was made possible for a student in his senior year to have a much wider range of elective work than formerly. The new system provided that of the 140 hours of credit required for graduation, 125 to 128 hours only are prescribed and 12 to 15 hours may be elected. These elections may be made up from the groups of studies outlined below or from other courses approved by the Head of the department of specialization.

The Group System allows the student to receive his instruction in the advanced subjects from a specialist. It also permits a student desiring to take up a fifth year of residence to specialize in some particular branch of engineering. A student in any group will be allowed to elect work in the other departments of engineering or in the other colleges or schools of the University, subject to the approval of the Head of the department. A student desiring to obtain special scientific knowledge or special business training by building on the fundamental subjects of engineering may be allowed to elect scientific courses or courses in Economics or Business Administration under the direction and approval of the Head of his department.

The groups of studies and the scope of the work which they cover are given in the following:

CIVIL ENGINEERING GROUPS

(A) *Structural Engineering.*—Covering the subjects of Roof Trusses, Arches, Bridges, Structural Framework of Buildings, and other structures.

Courses in theory and design of steel, concrete, and masonry are given by the department of Civil Engineering.

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Courses in strength and resistance of materials and testing materials are given by the department of Engineering Mechanics.

Courses in metallurgy, micro-metallurgy, and chemical technology of building materials are given by the department of Chemical Engineering.

(B) *Hydraulic Engineering.*—Covering the subjects of Hydro-Electric Power Development, Irrigation and Drainage, and Rivers and Harbors.

Courses in hydraulics, hydrography, and in theory and design of the different branches of hydraulic engineering are given by the department of Civil Engineering.

Courses in hydraulic machinery, water turbines, turbine design, and pumping machinery are given by the department of Mechanical Engineering.

Courses in electrical machinery, generating stations, and electrical distribution are given by the department of Electrical Engineering.

(C) *Railroad Transportation Engineering.*

Courses in railway location, construction and maintenance, railway design courses, and history of transportation are given by the department of Civil Engineering.

Surveying and advanced railway surveying courses are given by the department of Surveying.

Courses in elements of accounting, railway accounting, railway operation, railway finance, railway tariffs, and economics are given by the department of Economics.

Courses in signalling and electrical engineering are given by the department of Electrical Engineering.

(D) *Sanitary and Municipal Engineering.*—Covering the subjects of public water supplies, water purification for municipal and industrial purposes, city sewerage and drainage, the treatment and disposal of city sewage and industrial wastes, and general municipal and industrial sanitation.

Courses in theory, design, and laboratory are given by the department of Civil Engineering.

Courses in bacteriology, water analysis, and hygiene are given in the Medical School.

Courses in testing materials are given by the department of Engineering Mechanics.

Courses in heating and ventilation are given by the department of Mechanical Engineering.

Courses in city surveying are given by the department of Surveying.

Courses in economics and in municipal administration are given by the department of Economics.

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(E) *Highway Engineering and Highway Transport.*

Courses in highway engineering fundamentals, economics and theory, highway engineering design courses, laboratory courses in bituminous and non-bituminous paving materials, advanced courses in the construction and maintenance of earth, gravel, and broken-stone roads, bituminous surfaces, bituminous pavements, cement concrete pavements, and brick pavements, courses in highway bridges, specifications and contracts, municipal engineering, and highway transport, and highway engineering seminar courses are given by the department of Civil Engineering.

Courses in automobiles and motor trucks, mechanical handling of materials, and scientific management are given by the department of Mechanical Engineering.

Municipal surveying courses are given by the department of Surveying.

Courses in the elements of economics and accounting are given by the department of Economics.

Courses in geology are given by the department of Geology.

(F) *General Engineering Science.*—This group is specially arranged to permit civil engineering students who are candidates for the bachelor's degree, to secure the fundamental training in civil engineering and to pursue advanced elective work in mathematics, physics, astronomy, mechanics, or chemistry.

MECHANICAL ENGINEERING GROUPS

(A) *Steam Power Engineering.*—This group may include all the elective courses in Mechanical Engineering relative to steam prime movers, and auxiliary machinery found in steam power plants, including steam boilers, steam turbines, steam engines, coal handling machinery, pump and air compressors, power house design and construction.

(B) *Internal Combustion Engineering.*—Includes courses in Mechanical Engineering relating to internal combustion engines and gas producers, including oil, gas and gasoline engines, their design, construction, and operation.

(C) *Hydro-Mechanical Engineering,* which may include courses in hydraulic machinery such as turbines, reciprocating pumps, and centrifugal pumps. A special laboratory is maintained for the testing of hydraulic machinery.

(D) *Heating, Ventilating, and Refrigerating Engineering.* Special courses are given in Heating, Ventilation, and Refrigeration,

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including the design of heating and ventilating plants. The mechanical laboratory has special apparatus designed for conducting tests in Heating and Ventilation; it also has a refrigerating plant used entirely for experimental purposes.

(E) *Industrial Engineering.*—This group is arranged to provide for students who to prepare themselves for business branches of manufacturing plants or to study methods of management or production in manufacturing plants. It includes courses in shop management, motion study, design of shop machinery, and business administration. The engineering shops are used for experimental work in these lines.

(F) *Automobile Engineering.*—Special work is given in the design, construction and operation of the Automobile, which includes courses in engine and chassis design. A special laboratory is maintained for the experimental study of the Automobile.

Every student is required to elect a design course in some particular group. He must have the prerequisites in this group of studies for this design course which he elects.

ELECTRICAL ENGINEERING GROUPS

(A) *Communication Group.*—About Course 16—Advanced Telephones—which forms the key subject, the student may group selected courses bearing on the communicating arts or supplementing the technique thereof by the broader matters of economics, phonetics, etc.

(B) *Machine Design Group.*—Either Course 6 or 6*a* may be taken as the key subject supplemented by cognate subjects in Electrical, Mechanical, or Civil Engineering, or economics, aiming toward the preparing of the student for machine design, application, or factory production.

(C) *Power Group.*—Design Course 19 forms the key course about which may be grouped courses in Electrical, Civil, and Mechanical Engineering and economics, so as to train the student for the design and operation of power plants, the supervision of power production or its application in industry and transportation.

(D) *Railway Group.*—Course 8 in Electric Railways is the key course. The other group courses are Electrical, Mechanical, and Civil Engineering courses and courses in economics such as will fit the student for work on railways, either steam or electric, in operation, administration, or design.

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(E) *Illumination Group.*—About Course 15 in Advanced Lighting may be grouped courses in physics, chemistry, psychology, economics, architecture, and fine arts, such as will train the student toward ability to solve problems concerned with the most effective production of illuminants and their most efficient, effective, and artistic application.

CHEMICAL ENGINEERING GROUPS

(A) *Metallurgical Group.*—This group contains options from the advanced courses in metallurgy, and chemical engineering machinery in the department of Chemical Engineering; the testing of materials in the department of Engineering Mechanics; and courses in mineralogy and geology.

(B) *Gas Engineering Group.*—This group contains options from the courses in gas manufacture and chemical engineering machinery in the department of Chemical Engineering; gas engines, power plants, and the valuation of public utilities in the department of Mechanical Engineering; electrical distribution and illumination in the department of Electrical Engineering; and business organization and management in the department of Economics.

(C) *Organic Industrial Group.*—This group contains options from the courses in the department of Chemical Engineering covering the fundamental organic chemical industries along with options from the courses in theoretical and organic chemistry in the department of Chemistry; bacteriology in the Medical School; water purification and sewage disposal in the department of Civil Engineering; and courses in Economics.

(D) *General Manufacturing Group.*—This group contains options from the courses in chemical engineering machinery in the department of Chemical Engineering; from courses in mechanical engineering, electrical engineering, and economics; and eight hours of free electives.

(E) *Pulp and Paper Manufacturing Group.*—This group contains options from the courses in pulp and paper manufacture and the courses in chemical engineering machinery in the department of Chemical Engineering; from courses in identification of woods in Forestry and in the microscopic study of woody plants in Botany; from courses in Electrical Engineering; Mechanical Engineering; in hydraulics; in Civil Engineering; and in Economics.

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MARINE AND AERONAUTICAL ENGINEERING GROUPS

(A) *Naval Architecture.*—The courses in this department are arranged for those who wish to devote the principal part of their studies to the design and construction of ships. It also includes courses in the department of Engineering Mechanics, Mechanical Engineering, and Electrical Engineering.

(B) *Marine Engineering.*—The courses in this department are arranged for those who wish to specialize more in the design of the machinery connected with ships. Courses in steam turbines, gas and oil engines, and hydraulic machinery are given in the department of Mechanical Engineering, and courses in electrical machinery in the department of Electrical Engineering.

(C) *Aeronautical Engineering.*—Both theory and design of aeronautical structures are taught in these courses. Properties of the atmosphere; aerodynamics; resistance and propulsion, stability, and operation of all kinds of air craft, as well as the elements of motors, propellers, aerodromes, etc., are taken up and followed by courses in which designs illustrative of these principles are prepared.

SEQUENCE OF STUDIES

The work of the first year in the four-year curricula leading to the degree of Bachelor of Science in Engineering is the same for all students in the College of Engineering. At the end of the first year, all Engineering students elect either the civil engineering, the mechanical engineering, the electrical engineering, the chemical engineering, or the marine engineering curriculum.

There is a limited opportunity for electives, as outlined in the description of the group system, and credit obtained in advance at entrance may leave a place for further elections. After the first year the student may take work to the amount of *eighteen hours* per week, as arranged by the classification committee; but *he may wisely, in some cases, take a smaller number of hours,* if he can in that way do better work.

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REQUIREMENTS FOR GRADUATION

THE DEGREE OF BACHELOR OF SCIENCE IN ENGINEERING

To earn the degree of Bachelor of Science in Engineering, the student must secure *one hundred and forty hours of credit** in a prescribed curriculum, as given below, eight hours of which can be earned in one summer session. The diploma given indicates the line of study pursued. A time limit is not fixed; but four years and one summer session are usually needed for the work required for the degree.

HOURS OF WORK REQUIRED FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENGINEERING.

SUBJECT.	Civil	Mech.	Elec.	Chem.	Mar.	Aero.
English	6	6	6	6	6	6
Language and Cultural Electives	16	16	16	16	16	16
Mathematics	18	18	18	16	18	18
Physics	10	10	14	10	10	10
Chemistry	5	5	5	31	5	5
Astronomy	2	0	0	0	0	0
Geology	3	0	0	0	0	0
Drawing	4	4	4	4	4	4
Shop Practice	4	12	8	4	4	12
Surveying	15	2	2	2	2	2
Engineering Mechanics	12	12	12	7	12	12
Civil Engineering	22	3	3	0	3	3
Mechanical Engineering	2	28	4	9	26 or 20	23
Electrical Engineering	4	4	31	4	4	4
Chemical Engineering	3	3	3	19	3	3
Marine Engineering	0	0	0	0	15 or 21	0
Aeronautical Engineering	0	0	0	0	0	14
Group Option	12	17	14	12	12	8
Total	140	140	140	140	140	140

COMBINED COLLEGIATE AND ENGINEERING CURRICULUM

An arrangement has been entered into between Albion College and the College of Engineering of the University, whereby students who satisfactorily complete three years of work at Albion, including certain specified courses, may enroll in the College of Engineering,

* For explanation of the term Hour of Credit, and for further information about the courses prescribed for graduation, see Engineering Announcement.

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and receive the degree of Bachelor of Arts from Albion College at the end of their first year of residence at the University and the degree of Bachelor of Engineering at the end of the following year. The details of this course will be given in the Announcement of the College of Engineering.

A similar arrangement has been made with Olivet College.

FELLOWSHIPS IN CIVIL ENGINEERING

The *Roy D. Chapin Fellowship in Highway Transport.*—This Fellowship is offered to provide for the investigation of an approved subject relative to Highway Transport. It pays the sum of $250 with an allowance of $50 for expenses. Awarded to Herschel C. Smith, A.B., 1913; B.C.E., 1915.

The *Roy D. Chapin Fellowship in Highway Engineering.*—This Fellowship is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements. It pays the sum of $250 with an allowance of $50 for expenses. Awarded to Richard R. Fauver, A.B., 1917, Oberlin College.

Two *Detroit Edison Company Fellowships in Highway Engineering.*—These Fellowships are offered for the investigation of approved subjects relative to moderate cost country roads. Each Fellowship pays the sum of $250 with an allowance of $50 for expenses. Awarded to E. R. Olbrich, C.E., 1915, Pennsylvania State College; and Chia T. Yeh, B. Sc. in C. E., 1916, Government Institute of Technology, Shanghai, China; M.C.E., 1920, Cornell University.

National Steel Fabric Company Fellowship in Highway Engineering.—This Fellowship is offered to provide for the investigation of the design of cement-concrete pavements and foundations as structures. It pays the sum of $250 per semester or winter period, with an allowance of $50 for expenses. Awarded to Harold T. Corson, B.S. (C.E.), 1918.

COURSES OF INSTRUCTION

The courses offered for the year 1920-1921 are described below. The amount of credit toward graduation assigned to each course is indicated by the expressions *one hour, two hours,* etc.

ASTRONOMY

For a description of all courses offered in the department of Astronomy, see page 178.

Courses 3 and 4 treat of the theory and practice of making and reducing astronomical observations. These courses require day and night work at the Observatory during a portion of the semester.

Course 3*E* is prescribed for students in Civil Engineering in the second semester, sophomore year.

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FIRST SEMESTER

1. General Astronomy. The Solar System. Two sections. *Three hours.* Professors HUSSEY and CURTISS.
A descriptive course, including the fundamental principles of Astronomy, and a presentation of the leading facts respecting the sun, moon, planets, and comets. Occasional lantern illustrations.

3. Practical Astronomy. *Two hours.* Assistant Professor RUFUS.
The elements of Spherical Astronomy with practical applications. Theory of the sextant and transit and their use in the determination of time, latitude, longitude, and azimuth. The observational work at the Observatory in connection with this course will be varied to suit the needs of students from different departments.

3*E*. Spherical Astronomy. *Two hours.* Three sections. Professor CURTISS, Assistant Professor RUFUS, and Mr. ROSSITER.
A brief resumé of Descriptive Astronomy followed by a thorough drill in the principles of Spherical Astronomy and computation.

20. Navigation. (First Course). *Four hours.* Professor CURTISS.
Principles of Seamanship and Pilotage, with appropriate laboratory practice.

SECOND SEMESTER

2. General Astronomy. Stars and Nebulae. Two sections. *Three hours.* Professors HUSSEY and CURTISS.
A general descriptive course in stellar and nebular astronomy. Occasional lantern illustrations. May be taken in continuation with Course 1, or independently, as desired.

2*a*. Elementary Practical Astronomy. *One hour.* Dr. RUFUS.
Constellation studies and telescopic examinations of the heavenly bodies. Selected problems with the celestial globe and the equatorial telescope. Observational work during the day and night at the Observatory.

3*E*. Spherical Astronomy. *Two hours.* Three sections. Professor CURTISS, and Mr. ROSSITER.
A brief resumé of Descriptive Astronomy followed by a thorough drill in the principles of Spherical Astronomy and computation.

22. Navigation. (Second Course). *Three hours.* Professor CURTISS.
The principles of piloting, dead reckoning, and nautical astronomy, with appropriate observatory practice.

SUMMER SESSION OF 1921

(See College of Literature, Science, and the Arts.)

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CHEMICAL ENGINEERING

FIRST SEMESTER

1. Engineering Materials. Lectures and recitations. *Three hours.* Professors A. H. WHITE, and A. E. WHITE, Assistant Professors UPTHEGROVE, BAKER, and Mr. BROWN.
Prerequisite: Course 2*E* in Chemistry.

2. Fuels and their Utilization. Lectures and recitations. *One hour.* Professor BADGER.
Prerequisite: This course must be preceded or accompanied by Course 1 in Chemical Engineering and preceded by Course 2*E* in Physics.

4. Salts, Acids, and Alkalis. Lectures and recitations. *Two hours.* Assistant Professor BAKER.
Prerequisite: Courses 1 and 2 in Chemical Engineering, Course 8 or 8*E* in Chemistry, and Course 2*E* in Physics.

5. Chemical Technology of Carbon Compounds. Lectures and recitations. *Four hours.* Professor E. H. LESLIE.
Prerequisite: Courses 2 and 4 in Chemical Engineering and Courses 7 and 7*a* in Chemistry.

6. Metallurgy of Iron and Steel. Lectures and recitations. *Two hours.* Assistant Professor WOOD.
Prerequisite: Courses 1 and 2 in Chemical Engineering or Course 1 in Chemical Engineering and Course 3 in Mechanical Engineering.

8. Metallography. Lectures and laboratory work. *Two hours.* Assistant Professor UPTHEGROVE.
Prerequisite: This course must be preceded or accompanied by Course 6 in Chemical Engineering and preceded by Course 5 in Chemistry or Course 2 or 6 in Engineering Mechanics.

9. Technical Examination of Gas and Fuel. *Two hours.* Mr. GENIESSE.
Should be preceded or accompanied by Chemical Engineering 2.

10. Technical Examination of Gas, Fuel, and Water. *One hour.* Mr. BROWN.
Special course for mechanical engineers. Not open to chemical engineers.

12. Special Problems. Largely laboratory work. *Three to eight hours.* THE CHEMICAL ENGINEERING STAFF.
Prerequisite: Courses 1, 2, and 4 in Chemical Engineering, and Chemistry 28; with Course 5 in Chemical Engineering, and

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Chemistry 7 and 7*a* in addition if the subject involves organic chemistry; and Chemical Engineering 7 or 8 for metallurgical problems. A reading knowledge of French or German (preferably German) is also required.

13. Evaporation, Distillation, Filtration, and Transportation of Liquids on the Manufacturing Scale. *Two hours.* Professor BADGER.
Prerequisite: Courses 1, 2, and 4 in Chemical Engineering.

15. Seminary. Reading and reports on selected subjects. *Two hours.* Professor LESLIE.
Open only to graduates and seniors who receive special permission. A reading knowledge of German or French is required.

21. Special Laboratory Work. *Five to eight hours.* This is research work along special lines. These courses are open only to graduates and seniors who receive special permission.
a. The Constitution of Steel. Professor CAMPBELL.
b. Hydraulic Cements. Professor CAMPBELL.
c. Gas Manufacture and Purification. Professor A. H. WHITE. It should be preceded or accompanied by Course 16.
d. Paints and Varnishes. Professors A. H. WHITE, and HOLLEY.
e. Pulp and Paper. Professor A. H. WHITE.
h. Evaporation. Professor BADGER.
i. Ferrous Metallurgy. Professor A. E. WHITE.
j. Non-ferrous Metallurgy. Assistant Professor UPTHEGROVE.
k. Fuel Oils and Motor Fuels. Professor LESLIE.

24. Pyrometry and Furnace Design. *Two hours.* Assistant Professor WOOD.
Prerequisite: Course 2 and 6 in Chemical Engineering.

26. Advanced Ferrous Metallurgy. *Two hours.* Professor A. E. WHITE.
Prerequisite: Course 8 in Chemical Engineering.

27. Design of Chemical Engineering Machinery. Drafting and consultations. *Two or more hours.* Professor BADGER.
Prerequisite: Course 13 in Chemical Engineering, and Course 2 in Mechanical Engineering.

SECOND SEMESTER

1, Engineering Materials. Lectures and recitations. *Three hours.* Professors A. H. WHITE, and A. E. WHITE, Assistant Professors UPTHEGROVE, and BAKER, and Mr. BROWN.
Prerequisite: Course 2*E* in Chemistry.

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2. Fuels and their Utilization. Lectures and recitations. *One hour.* Professor BADGER.
Prerequisite: This course must be preceded or accompanied by Course 1 in Chemical Engineering and preceded by Course 2*E* in Physics.

4. Salts, Acis, and Alkalies. Lectures and recitations. *Two hours.* Professor A. H. WHITE.
Prerequisite: Course 1 in Chemical Engineering, Course 8 or 8*E* in Chemistry, and 2*E* in Physics.

5. Chemical Technology of Carbon Compounds. Lectures and recitations. *Four hours.* Professor LESLIE.
Prerequisite: Courses 2 and 4 in Chemical Engineering, and Courses 7 and 7*a* in Chemistry.

6. Metallurgy of Iron and Steel. *Two hours.* Assistant Professor WOOD.
Prerequisite: Courses 1 and 2 in Chemical Engineering; or Course 1 in Chemical Engineering and Course 3 in Mechanical Engineering.

7. Non-ferrous Metals. Lectures and recitations. *Two hours.* Assistant Professor UPTHEGROVE.
Prerequisite: Courses 1 and 2 in Chemical Engineering or Course 1 in Chemical Engineering and Course 3 in Mechanical Engineering.

8. Metallography. Lectures and laboratory work. *Two hours.* Assistant Professor UPTHEGROVE.
Prerequisite: This course must be preceded or accompanied by Course 6 in Chemical Engineering and preceded by Course 5 in Chemistry or Course 2 or 6 in Engineering Mechanics.

9. Technical Examination of Gas and Fuel. *Two hours* Mr. GENIESSE.
Should be preceded or accompanied by Chemical Engineering 2.

10. Technical Examinations of Gas, Fuel, and Water. *One hour.* Mr. BROWN.
Special course for mechanical engineers. Not open to chemical engineers.

12. Special Problems. Largely laboratory work. *Three to eight hours.* The Chemical Engineering Staff. Same as Course 12 the first term.

14. Machinery and Processes for Conveying, Drying, Calcining, and Grinding. Lectures and recitations. *Two hours.* Professor BADGER.
Prerequisite: Courses 1, 2, and 6 in Chemical Engineering.

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16. Gas Manufacture. Lectures and recitations. *Two hours.* Professor LESLIE.
Prerequisite: Course 5 in Chemical Engineering, and Course 3 in Mechanical Engineering.

18. Non-ferrous Metallography. *Two hours.* Assistant Professor UPTHEGROVE.
Prerequisite: Course 7 in Chemical Engineering.

21. Special Laboratory Work. *Five to eight hours.* This is research work along special lines. These courses are only open to graduates and seniors who receive special permission.
The same subjects are offered as in the first semester.

23. Design of Chemical Plants. Lectures and recitations. *Two hours.* Professor BADGER.
Prerequisite: Course 13 in Chemical Engineering.

24. Pyrometry and Furnace Design. *Two hours.* Assistant Professor WOOD.
Prerequisite: Courses 2 and 6 in Chemical Engineering.

27. Design of Chemical Engineering Machinery. Drafting and consultation. *Two or more hours.* Professor BADGER.
Same as Course 27 in the first semester.

SUMMER SESSION OF 1921

1. Engineering Materials. *Three hours.* Professor LESLIE.

2. Fuels and their Utilization. *One hour.* Mr. BROWN.

6. Metallurgy of Iron and Steel. *Two hours.* Assistant Professor UPTHEGROVE.

8. Metallography of Iron and Steel. *Two hours.* Assistant Professor UPTHEGROVE.

9. Technical Examination of Gas and Fuel. *Two hours.* Mr. BROWN, and Assistant.

10. Gas and Fuel Analysis. *One hour.* Mr. BROWN.

12. Chemical Technology. *Three to eight hours.* Professor LESLIE, Assistant Professor UPTHEGROVE, and Mr. BROWN.

CHEMISTRY

For a description of all courses offered in the department of Chemistry, see page 191.

Students admitted with a deficiency in entrance chemistry must remove it by completing Course 1, or 1*b*, but the credit thus obtained is entered on the admission, not the graduation requirements.

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Other courses in chemistry are given in the College of Literature, Science, and the Arts, and may be elected by students of the Colleges of Engineering and Architecture, who have had the requisite preparation.

FIRST SEMESTER

1. General and Inorganic Chemistry. Experimental lectures, recitations, and laboratory work. *Four hours.* (For entrance, see above.) Professor BIGELOW.

2*E*. Principles of Inorganic Chemistry. Lectures, recitations, and laboratory. *Five hours.* Dr. HODGES, and Assistants.
Open to those who have passed the entrance requirements in chemistry.

3. Qualitative Analysis. Recitations and laboratory work. *Five hours.* Assistant Professor CARNEY, Mr. COLE, and Mr. McALPINE.
Open to those who have completed Courses 2 or 2*E*.

3*a*. Qualitative Analysis. Recitations and laboratory work. *Four hours.* Mr. SOULE.
Open to those who have completed Course 2 or 2*E*.

3*b*. Qualitative Analysis. Continuation of Course 3*a*. *Four hours.* Mr. COLE.

5. Quantitative Analysis. Beginning course. Recitations and laboratory work. *Five hours.* Professor WILLARD, and Assistant Professor MELOCHE.
Open to those who have completed Course 3 or 3*b*.

7. Organic Chemistry. Lectures and laboratory work. *Five hours.* Professor GOMBERG, Assistant Professor SCHOEPFLE, and Mr SULLIVAN.
Open to those who have completed Course 3 or 3*b*.

8*E*. Elementary Theoretical and Physical Chemistry. Lectures and recitations. *Three hours.* Professor BARTELL.
Open to those who have had Chemistry 3 or 3*b*, Physics 2, and Calculus.

15. History of Chemistry and Development of Chemical Theory. *Two hours.* Professor SMEATON.

28. Advanced Quantitative Analysis. Laboratory work, with lectures and quiz. *Three to five hours.* Professor WILLARD.
Open to those who have completed Course 5.

29. Elementary Chemical Miscroscopy. *Two hours.* Assistant Professor CARNEY.

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34. Chemical Reading. *One hour.* Professor CAMPBELL.

43. Advanced Organic Chemistry and Ultimate Analysis. Laboratory work and reading. *Two to four hours.* Professor GOMBERG, and Assistant Professor SCHOEPFLE.

SECOND SEMESTER

1*b*. General and Inorganic Chemistry. *Four hours.* Lectures, recitations, and laboratory. Professor LICHTY.
This course offers an opportunity for those entering the University at the opening of the second semester to commence the study of chemistry, but no student will be admitted who might have elected Course 1. Special permission must be obtained from the instructor in order to elect this course.

2*E*. Principles of Inorganic Chemistry. Lectures, recitations, and laboratory. *Five hours.* Dr. HODGES, and Assistants.
Open to those who have passed the entrance requirements in chemistry.

2. General Inorganic Chemistry. Lectures and recitations. Continuation of Course 1. *Four hours.* Professor SMEATON.

3. Qualitative Analysis. Recitations and laboratory work. *Five hours.* Assistant Professor CARNEY, Mr. COLE, and Mr. MCALPINE.
Open to those who have completed Course 2 or 2*E*.

3*a*. Qualitative Analysis. Recitations and laboratory work. Three sections. *Four hours.* Mr. COLE, and Mr. SOULE.
Open to those who have completed Course 2 or 2*E*.

3*b*. Qualitative Analysis. Continuation of Course 3*a*. *Four hours.* Mr. COLE.

5. Quantitative Analysis. Beginning course. Recitations and laboratory work. *Five hours.* Professor WILLARD, and Assistant Professor MELOCHE.
Open to those who have completed Course 3 or 3*b*.

7*a*. Organic Chemistry. Continuation of Course 7. *Five hours.* Lectures, recitations, and laboratory work. Professor GOMBERG, Assistant Professor SCHOEPFLE, and Mr. SULLIVAN.
Open to those who have completed Course 3 or 3*b*, and who receive special permission.

8. Elementary Theoretical and Physical Chemistry. *Four hours.* Professor BIGELOW.

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15. History of Chemistry and Development of Chemical Theory. *Two hours.* Professor SMEATON.

28. Advanced Quantitative Analysis. Laboratory work, with lectures and quiz. *Three to five hours.* Professor WILLARD. Open to those who have completed Course 5.

29. Elementary Chemical Microscopy. *Two hours.* Assistant Professor CARNEY.

34. Chemical Reading. *One hour.* Professor CAMPBELL. Course 34 requires special permission.

43. Advanced Organic Chemistry and Ultimate Analysis. Laboratory work and reading. Continuation of Course 42. *Two to four hours.* Professor GOMBERG, and Dr. BRITTON.

SUMMER SESSION OF 1921

(See College of Literature, Science, and the Arts.)

CIVIL ENGINEERING

The work offered in this department includes Structural, Hydraulic, Transportation, Municipal, Sanitary, Highway, and Geodetic Engineering.

The Announcement of the College of Engineering should be consulted for information as to the sequence of courses.

FIRST SEMESTER

1. Drafting Room Practice. *Two hours.* Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

2. Theory of Structures. *Three hours.* Professors GRAM and CISSEL, Assistant Professor ERIKSEN, Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

2*a*. Elementary Designing Structures. *Two hours.* Assistant Professor ERIKSEN, Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

3. Masonry. *Three hours.* Professors GRAM and CISSEL, and Assistant Professor ERIKSEN.

5. Design of Structures. *Three hours.* Professor CISSEL.

6. Advanced Masonry and Foundations. *Two hours.* Professor GRAM.

10. Hydrology. *Three hours.* Professor KING.

11. Hydraulics. *Two hours.* Professor KING.

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20. Railroad Location. *Two hours.* Mr. ALT.

23. Railroad Construction and Maintenance. *Two hours.* Professor RIGGS.

26. Specifications and Contracts. *Two hours.* Professor RIGGS.

30. Water Works. *Three hours.* Professors HOAD and DECKER.

32. Sewerage. *Two hours.* Professors HOAD and DECKER.

34. Municipal and Industrial Sanitation. *Two hours.* Professor HOAD.

35. Sanitary Engineering Design. *Three hours.* Professor DECKER.

40. Highway Engineering. *Two hours.* Professor BLANCHARD.

42. Highway Engineering Laboratory. *Two hours.* Assistant Professor BATEMAN.

60. Sanitary Engineering Research. Credit to be arranged. Professors HOAD and DECKER.

66. Highway Engineering Research. Credit to be arranged. Professor BLANCHARD.

SECOND SEMESTER

1. Drafting Room Practice. *Two hours.* Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

2. Theory of Structures. *Three hours.* Professors GRAM and CISSEL, Assistant Professor ERIKSEN, Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

2a. Elementary Design of Structures. *Two hours.* Assistant Professor ERIKSEN, Mr. ALT, Mr. ELLIOTT, and Mr. POPE.

3. Masonry. *Three hours.* Professor CISSEL, and Assistant Professor ERIKSEN.

4. Higher Structures. *Two hours.* Professor GRAM.

5. Design of Structures. *Three hours.* Professor CISSEL, and Assistant Professor ERIKSEN.

6. Advanced Masonry and Foundations. *Two hours.* Professors GRAM and CISSEL.

7. Advanced Design of Structures. *Three hours.* Professor CISSEL, and Assistant Professor ERIKSEN.

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7a. Concrete and Steel Highway Bridge Design. *Three hours.* Professor CISSEL, and Assistant Professor ERIKSEN.

8. Analysis and Design of Arches. *Two hours.* Professor CISSEL.

10. Hydrology. *Three hours.* Assistant Professor WISLER.

12. Development of Water Power. *Three hours.* Professor KING.

13. Administration of Water Resources. *Two hours.* Professor JOHNSTON.

14. Irrigation and Drainage. *Two hours.* Professors KING and JOHNSTON.

16. Design of Hydraulic Structures. *Three hours.* Professor KING, and Assistant Professor WISLER.

18. Rivers and Harbors. *One hour.* Professor KING.

24. Railroad Engineering. *Three hours.* Professor RIGGS.

26. Specifications and Contracts. *Two hours.* Professor RIGGS.

27. Public Utility Problems. *One hour.* Professor RIGGS.

30. Water Works. *Three hours.* Professor HOAD.

31. Water Purification. *Two hours.* Professor DECKER.

32. Sewerage. *Two hours.* Professor DECKER.

33. Sewage Disposal. *Two hours.* Professor HOAD.

35. Sanitary Engineering Design. *Three hours.* Professor DECKER.

36. Municipal Engineering. *Two hours.* Professor HOAD, and Assistant Professor BATEMAN.

40. Highway Engineering. *Two hours.* Professor BLANCHARD.

41. Highway Transport Surveys and the Theory and Economics of Highway Improvements. *Two hours.* Professor BLANCHARD.

42. Highway Engineering Laboratory. *Two hours.* Assistant Professor BATEMAN.

43. Highway Engineering Design. *Three hours.* Assistant Professor BATEMAN.

44. Highway Transport Economics, Methods, Legislation and Management. *Two hours.* Professor BLANCHARD.

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60. Sanitary Engineering Research. Credit to be arranged. Professors HOAD and DECKER.

61. Irrigation and Drainage. *Two hours.* Professors KING and JOHNSTON.

62. Advanced Hydraulic Design. *Two hours.* Professor KING.

63. Advanced Railway Design. *Three hours.* Professor RIGGS.

64. Hydraulic Engineering Research. Credit to be arranged. Professor KING.

65. Structural Engineering Research. Credit to be arranged. Professor GRAM.

66. Highway Engineering Research. Credit to be arranged. Professor BLANCHARD.

SUMMER SESSION OF 1921

2. Theory of Structures. *Three hours.* Mr. ALT.

Graduate Short Period Courses

Graduate work in highway engineering and highway transport leading to the degree of Master of Science or Master of Science in Engineering, has been arranged especially for men engaged in the practice of highway engineering and highway transport. These courses will be given *in periods of two weeks each* during the months from December to March, inclusive. This plan will afford highway engineers, chemists, contractors, engineer-salesmen, highway transport engineers and managers, motor truck salesmen, and others interested in highway engineering and highway transport an opportunity to obtain advanced knowledge during the season of the year when a leave of absence may be easily obtained. These courses are open only to graduate students and qualified special students.

67. Highway Transport Surveys. *Two hours.* Professor BLANCHARD.

68. Bituminous Surfaces and Bituminous Pavements. *Two hours.* Professor BLANCHARD.

69. Highway Laboratory Research. *Two hours.* Assistant Professor BATEMAN.

70. Highway Structures. *Two hours.* Professor GRAM.

71. Highway Specifications, Contracts and Jurisprudence. *Two hours.* Professor RIGGS.

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72. Earth, Sand-Clay, Gravel and Broken Stone Roads. *Two hours.* Assistant Professor BATEMAN.

73. Brick, Cement-Concrete, Stone Block and Wood Block Pavements. *Two hours.* Assistant Professor BATEMAN.

74. Bituminous Materials. *Two hours.* Assistant Professor BATEMAN.

75. Highway Engineering Seminar. *Two hours.* Professor BLANCHARD.

76. Highway Engineering Theory, Design and Economics. *Two hours.* Professor BLANCHARD.

77. Highway Engineering Financing, Administration and Organizations. *Two hours.* Professor BLANCHARD.

78. Grading Machinery and Operations. *Two hours.* Assistant Professor BATEMAN.

79. American and English Highway Traffic Legislation and Regulations. *Two hours.* Professor BLANCHARD.

80. Interrelationship of Highway, Railway and Waterway Transport. *Two hours.* Professor RIGGS.

81. American and English Highway Transport Methods. *Two hours.* Professor BLANCHARD.

82. Highway Transport Management, Costs and Record Systems. *Two hours.* Professor BLANCHARD.

83. Highway Transport Seminar. *Two hours.* Professor BLANCHARD.

DRAWING

FIRST SEMESTER

1. Geometrical Drawing. *Two, three* or *four hours.* (Elective). Assistant Professor FINCH.

1*d*. Instrumental and Free-Hand Drawing. Three sections. This course is planned for students of Dentistry. *One hour.* Assistant Professor ORBECK, Mr. HUDNUTT, Mr. COLE, and Mr. HANSEN.

4. Descriptive Geometry I. Lectures and Drawing. *Two hours.* Thirteen sections. Professor GOULDING, Assistant Professors FINCH, ORBECK, PALMER, Mr. HEYDEN, Mr. HUDNUT, Mr. CLARK, Mr. COLE, Mr. COOK, Mr. HANSEN, and Mr. POTTER.

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4a. Descriptive Geometry and Shades and Shadows. Recitations and drawing. *Three hours.* Assistant Professor BENNETT.

5. Descriptive Geometry II. Lectures and Drawing. *Two hours.* Five sections. Course 5 must be preceded by Course 4. Professor GOULDING, Assistant Professors FINCH and PALMER, Mr. HUDNUTT, and Mr. CLARK.

10. Free-Hand Lettering. *Two hours.* (Elective). Assistant Professor PALMER.

SECOND SEMESTER

1. Geometrical Drawing. *Two, three* or *four hours.* (Elective). Assistant Professor FINCH.

1d. Instrumental and Free-Hand Drawing. This course is planned for students of Dentistry. *One hour.* Mr. HUDNUT.

4. Descriptive Geometry I. Lectures and Drawing. Five sections. *Two hours.* Professor GOULDING, Assistant Professors FINCH, ORBECK, PALMER, and Mr. HEYDEN.

4a. Descriptive Geometry and Shades and Shadows. Recitations and drawing. *Three hours.* Assistant Professor BENNETT.

5. Descriptive Geometry II. Lectures and Drawing. Twelve sections. *Two hours.* Professor GOULDING, Assistant Professors FINCH, BENNETT, ORBECK, PALMER, Mr. HEYDEN, Mr. HUDNUT, Mr. CLARK, Mr. COLE, Mr. COOK, Mr. HANSEN, and Mr. POTTER.

Course 5 must be preceded by Course 4.

5a. Advanced Projections and Stereotomy. *Two hours.* Assistant Professor BENNETT.

10. Free-Hand Lettering. *Two hours.* (Elective). Assistant Professor PALMER.

SUMMER SESSION OF 1921

A. Free-Hand Drawing in Charcoal and Pencil, and Painting in Water-Color. *Two hours.* Mr. SLUSSER.

C. Descriptive Geometry. *Four hours.* Assistant Professor FINCH.

1. Geometrical Drawing. *Two, three,* or *four hours.* Assistant Professor FINCH.

1d. Instrumental and Free-Hand Drawing. *One hour.* Professor GOULDING.

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4. Descriptive Geometry I. *Two hours.* Professor GOULDING.

5. Descriptive Geometry II. *Two hours.* Professor GOULDING.

ELECTRICAL ENGINEERING

BOTH SEMESTERS

1. Elementary Electrical Design. Recitations and drawing. *Two hours.* Professor BAILEY, and Assistant Professor MOORE. Prerequisite: Drawing 4.

2. Electrical Apparatus and Circuits I. (Fundamentals.) Recitations and laboratory work. *Four hours.* Professor PARKER, Assistant Professors DAVIDSON and STASON, Mr. FAIRMAN, Mr. DREESE, and Mr. ANDERSON.
Prerequisites: Courses 1*E* and 2*E* in Physics and Course I in Engineering Mechanics.

2*a*. This course is similar to Course 2, but is intended exclusively for non-electrical students. Recitations and laboratory work. *Four hours.* Professors PARKER, HIGBIE, and LOVELL, Assistant Professors DAVIDSON, MOORE, STASON, Mr. FAIRMAN, Mr. DREESE, Mr. ANDERSON, and Mr. ATTWOOD.

3. Electrical Apparatus and Circuits II. (Theory). Recitations and laboratory work. *Four hours.* Professors HIGBIE and CANNON, and Assistant Professor DAVIDSON.
Prerequisite: Course 2.

4. Electrical Apparatus and Circuits III. (Advanced Theory). Recitations and laboratory work. *Three hours.* Professor BAILEY, Mr. FAIRMAN, and Mr. ANDERSON.
Prerequisite: Course 3.
Note:—Course 2 is devoted mainly to the study of direct current circuits and machines; Course 3 to alternating current circuits and machines; Course 4 to operating characteristics of rotary alternating current machines. While it is impracticable to keep these subjects segregated as clearly as might be understood from the above statement, it has been found that this arrangement of the ground to be covered in the study of the fundamentals of electric circuits and machines enables the teaching to be done most effectively.
Students of high proficiency may, after completing Course 2, take certain of the specialized courses described in the following paragraphs, although those who will take Course 3 are advised, and electrical students are required, to complete Course 3 before taking the specialized courses with the exception of 5, 7.

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30, 31, 35, 36, which may be taken by electrical students simultaneously with Course 3.

5. Design of Electrical Machinery and Appliances. Lectures, recitations, and drawing. *Four hours.* Professor BAILEY, and Assistant Professor MOORE.
Prerequisite: Courses 1, 3, and 14.

7. Illumination and Photometry. Lectures, recitations, and laboratory work. *Two hours.* Professor HIGBIE, Assistant Professor DAVIDSON, and Mr. ANDERSON.
Prerequisite: Course 2.

9. Special Laboratory Problems. *Credit to be arranged.*
Prerequisite: Course 3.

11. Power Plants, Transmission and Distribution. Lectures and recitations. *Five hours.* Professors PARKER and LOVELL.
Prerequisite: Course 3.

[13. Principles of Electric Communication. Lectures, recitations, and laboratory work. *Four hours.*
Prerequisite: Course 3. Not offered in 1920-1921.]

14. Mechanism of Electrical Machines. Lectures, recitations, and drawing. *Three hours.* Professor BAILEY.
Prerequisites: Course 1 in Electrical Engineering, and Course 2 in Engineering Mechanics.

17. Electromechanics. Lectures and recitations. *Four hours.* Professor CANNON.
Prerequisite: Course 3.

18. Research Work. *Hours to be arranged.* Various members of the Department Faculty.
May be elected only by permission of the Head of the department.

FIRST SEMESTER ONLY

8. Principles of Electric Traction. Lectures and recitations. *Two hours.* Professor LOVELL.
Prerequisite: Course 3.

33. Industrial Electrical Engineering. Lectures and recitations. *Two hours.* Professor LOVELL.
Prerequisite: Course 3.

SECOND SEMESTER ONLY

6. Design of Electrical Machinery and Appliances. Lectures, recitations, and drawing. *Two hours.* Professor BAILEY.
Prerequisite: Course 5.

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6*A*. (An extended form of Course 6). *Four hours.* Professor BAILEY.

10. Advanced Theory of Electrical Machinery and Circuits. Lectures and reading. *Two hours.* Professor BAILEY.
Prerequisite: Course 3.

15. Advanced Lighting. Lectures, recitations, and laboratory work. *Two hours.* Professor HIGBIE.
Prerequisite: Course 7.

[16. Advanced Telephones. Recitations and laboratory work. *Three hours.*
Prerequisite: Course 13. Not offered in 1920-1921.]

19. Study of Design, Power Plants. Lectures and design problems. *Two hours.* Professor LOVELL.
Prerequisite: Course 11.

20. Study of Design, Electric Transmission and Distribution Systems. *Two hours.* Professor PARKER.
Prerequisite: Course 11.

[22. Radio Telegraphy and Telephony. Lectures, recitations, and laboratory work. *Two hours.*
Prerequisite: Course 13. Not offered in 1920-1921.]

[25. Electrical Engineering Colloquium. *Two hours.*
(By invitation only). Not offered in 1920-1921.]

36. Rates and Cost Analysis. Lectures and recitations. *One hour.* Professor PARKER.
Prerequisite: Course 2. Open to seniors only.

SUMMER SESSION OF 1921

2. Electrical Apparatus and Circuits I. *Four hours.* Professor PARKER, and Mr. DREESE.

2*a*. Electrical Apparatus and Circuits I. Designed for Engineering students other than electrical engineers. *Four hours.* Assistant Professor MOORE, Mr. FAIRMAN, and Mr. DREESE.

3. Electrical Apparatus and Circuits II. *Four hours.* Professor CANNON.

4. Electrical Apparatus and Circuits III. *Three hours.* Professor BAILEY.

5. Design of Electrical Machinery and Appliances. *Four hours.* Professor BAILEY.

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11. Power Plants. *Five hours.* Professor PARKER.

17. Electromechanics. *Four hours.* Professor CANNON.

18. Research Work in Electrical Engineering. *Credit to be arranged.*

ENGINEERING MECHANICS

BOTH SEMESTERS

1. Statics, Center of Gravity, Movements of Inertia. Nine sections. *Four hours.* Professors PATTERSON, AIREY, and MENEFEE, Associate Professor VAN DEN BROEK, Assistant Professors STEVENS, SWINTON, and OLMSTEAD.

   Course 1 must be preceded by Course 3*E* in Mathematics and Course 1*E* in Physics.

2. Strength and Resistance of Materials. Fundamentals of Structural Design. Theory of strength and stiffness of beams, girders, columns, shafts, etc. Twelve sections. *Three hours.* Professors PATTERSON and MENEFEE, Associate Professor VAN DEN BROEK, Assistant Professors SWINTON and ERIKSEN, and Mr. LIDDECOAT.

   Course 2 must be preceded by Course 1 in Engineering Mechanics.

3. Dynamics. Work and Energy. The use of velocity, acceleration and other diagrams in the studying of dynamic problems relating to machines. Nine sections. *Three hours.* Professors PATTERSON and AIREY, Assistant Professors STEVENS, SWINTON, and ERIKSON, and Mr. LIDDECOAT.

   Course 3 must be preceded by Course 1 in Engineering Mechanics.

4. Hydromechanics. Pressure of Fluids. Flotation. Flow of water through pipes and orifices, over weirs, and in open channels. Seven sections. *Two hours.* Professor MENEFEE, Assistant Professor OLMSTEAD, and Mr. LIDDECOAT.

   Course 4 must be preceded by Course 1 in Engineering Mechanics.

5. Testing Materials. A study of methods and results of laboratory investigations of the physical properties of engineering materials. *Two hours.* Professor MENEFEE, and laboratory assistant.

   Course 5 must be preceded by Courses 1 and 2 in Engineering Mechanics.

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SECOND SEMESTER ONLY

6. Strength of Materials. Testing. The elementary theory of the strength of ties, struts, beams, and shafts. Laboratory practice in commercial testing and investigation methods. *Three hours.* Professor MENEFEE, and laboratory assistant.

Course 6 must be preceded by Course 1 or 2 in Engineering Mechanics. It is an abridgment of the work covered in Courses 2 and 5, and may not be elected by any one who has passed, or intends to elect either of these courses.

SUMMER SESSION OF 1921

1. Statics. *Four hours.* Professor PATTERSON, and Mr. LIDDICOAT.

2. Strength and Elasticity of Materials. *Three hours.* PROFESSOR VAN DEN BROEK, and Assistant Professor STEVENS.

3. Dynamics. Work and Energy. *Three hours.* Assistant Professor STEVENS.

4. Hydromechanics. *Two hours.* Mr. LIDDICOAT.

ENGLISH

The work in English is based on the assumption that the engineering or architectural student needs in general to be able to speak and to write, and to enjoy books in a sensible and discriminating way. He must also prepare definitely for the particular kind of writing demanded by his profession. There have been provided, therefore, in addition to the general reading and writing courses, a number of technical courses designed to meet the special needs of the student in engineering and architecture.

FIRST SEMESTER

1. Theme-Writing and Oral Expression. *Four hours.* Fifteen sections. Mr. KLOCKSIEM, Mr. EGLY, Mr. WALTON, Mr. LYMAN, Mr. TEN HOOR, Mr. KEENA, Mr. DAHLSTROM.

There are, in addition, four sections for students in the College of Dental Surgery.

1*a*. Theme-Writing and Oral Expression. *Two hours.* Mr. KEENA.

1*x*. Theme-Writing. For students conditioned in 1 and 1*a*. *Two hours without credit.* Mr. WENGER.

2. Theme-Writing and Oral Expression. *Two hours.* Mr. KLOCKSIEM.

3. Oral Exposition and Argument. *Two hours.* Mr. EGLY.

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4. Note-Taking. *Two hours.* Mr. WALTON.

6. Report-Writing. For juniors and seniors. *Two hours.* Two lectures and six quiz sections. Professor NELSON.

9. Business English. For juniors and seniors. Advertising and Commercial Correspondence. *Two hours.* Four sections. Assistant Professor THORNTON, and Mr. LYMAN.

10. Business English Sales. For juniors and seniors. *Two hours.* Two sections. Assistant Professor THORNTON.

14. The Engineer and His Reading. For juniors and seniors. *Two hours.* ——— ———.

16. English for Foreign Students. *Two hours.* Four hours recitation required. Mr. TEN HOOR.

21. Readings in Contemporary Literature. *Two hours.* Two sections. Assistant Professor SCHNEIDER.

23. The Modern Novel. *Two hours.* Mr. LANGWORTHY.

24. The Short Story. *Two hours.* Assistant Professor SCHNEIDER.

SECOND SEMESTER

1. Theme-Writing and Oral Exposition. *Four hours.* Ten sections. Mr. KLOCKSIEM, Mr. EGLY, Mr. WENGER, Mr. WALTON, Mr. LYMAN, Mr. TEN HOOR, Mr. KEENA, Mr. DAHLSTROM.

1*x*. Theme-Writing. For students conditioned in 1 and 1*a*. *Two hours without credit.* Mr. WENGER.

2. Theme-Writing and Oral Exposition. *Two hours.* Mr. KLOCKSIEM.

2*a*. Theme-Writing and Oral Exposition. *Two hours.* Mr. KEENA. There are also four sections of English 2 for students in the College of Dental Surgery.

3. Oral Exposition and Argument. *Two hours.* Mr. EGLY.

4. Note-Taking. *Two hours.* Two sections. Mr. WALTON.

5. Scientific and Technical Papers. For juniors and seniors. *Two hours.* Mr. TEN HOOR.

6. Engineering Reports. For juniors and seniors. *Two hours.* Three lectures and seven quiz sections. Professor NELSON.

9. Business English. For juniors and seniors. *Two hours.* Four sections. Assistant Professor THORNTON, and Mr. LYMAN.

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10. Business English. For juniors and seniors. *Two hours.* Six sections. Assistant Professor THORNTON.

14. The Engineer and His Reading. For juniors and seniors. *Two hours.* Mr. LANGWORTHY.

17. English for Foreign Students. *Two hours.* Four recitations required. Mr. KLOCKSIEM.

21. General Reading Course. *Two hours.* Three sections. Assistant Professor SCHNEIDER, Mr. WALTON, and Mr. TEN HOOR.

23. The Modern Novel. *Two hours.* Two sections. Mr. LANGWORTHY, and Mr. KLOCKSIEM.

24. The Short Story. *Two hours.* Two sections. Assistant Professor SCHNEIDER.

26. The Modern Drama. *Two hours.* Mr. WENGER.

27. Scientific Literature. *Two hours.* Assistant Professor THORNTON.

SUMMER SESSION OF 1921

1. Theme-Writing and Oral Exposition. *Four hours.* Assistant Professor SCHNEIDER.

14. The Engineer and His Reading. *Two hours.* Assistant Professor SCHNEIDER.

GEOLOGY AND GEOGRAPHY

For a description of all courses offered in the department of Geology, see page 255.

The courses in Geology are planned to meet the requirements of students of engineering whose profession makes some knowledge of geology essential; men who are to have in their hands the control or operation of mines; and consulting geologists and geological engineers.

Research is especially encouraged along the lines of structural geology, paleontology, glacial geology, geography, and geophysics.

FIRST SEMESTER

1*A*. Introduction to Geology, for Engineering and Forestry Students. A course adapted to the needs of students in these departments but open to others as well. *Three hours.* Professor HOBBS, and Assistant.

Students who can spare the time are recommended to take 1*b* as a continuation. (See below.)

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16*a*. Economic Geology (non-metals). A general course treating of the nature, occurrence, and distribution of the non-metallic mineral resources such as coal, oil and gas, salt, gypsum, building stones, phosphate rock, etc. Geology 1*a* or 1*E* and Mineralogy 1 are prerequisite, while Geology 1*b* is strongly recommended. *Three hours.* Professor COOK.

27. Oil Geology. A course treating of the origin, occurrence, and exploitation of deposits of oil and gas. This course should be preceded by Course 1*E* (or 1*a* and 1*b*), and should be followed by Courses 6 and 28. *Three hours.* Professor COOK.

SECOND SEMESTER

1. Introduction to Geology for Engineering and Forestry Students. A course adapted to the needs of students in these departments, but open to others as well. *Three hours.* Professor HOBBS, and Assistant.

Students who can spare the time are recommended to continue later with 1*b*.

1*B*. Elementary Historical Geology. A course describing the stratigraphy of North America and the origin and evolution of life during geological time. Lectures and laboratory work. *Three hours.* Professor CASE, and Assistant.

15*F*. Soil Geology. A comprehensive survey of the subject including the origin of soils, their physical and chemical constitution, the influence of climate on soil fertility, irrigation and drainage, tillage, fertilizers, etc., and a consideration of the regolith of the United States in relation to geologic, physiographic, and climatic factors. Geology 1*a* or 1E and Mineralogy 1 and 9 are prerequisites. *Three hours.* (The attention of students desiring additional laboratory work is directed to Course 26). Professor COOK.

16*b*. Economic Geology (metals). In this course the metallic mineral resources are treated in the same manner as are the non-metallic resources during the first semester. Although this course may be elected independently of Geology 15*a*, both are essential to a general survey of the subject. Prerequisites the same as for Geology 16*a*. *Three hours.* Professor COOK.

28. The Stratigraphy of Oil Geology. A course describing the distribution and stratigraphic relations of the various oil horizons. This course should follow Course 27. *Three hours.* Professor CASE.

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MATHEMATICS

Professors ZIWET, BUTTS, FIELD, and RUNNING, Associate Professors LOVE, and HILDEBRANDT, Assistant Professors HOPKINS, POOR, NELSON, ROUSE, and DENTON, Mr. BLESSING, Mr. KAZARINOFF, Mr. GALLADE, Mr. JONES, Mr. OLSON, Mr. SIMMONS, and Mr. GANDIS.

Students of engineering are required to take in order Courses 1, 2, 3, and 4. Course 4 may be replaced by Courses *4a* and *4b*. Students of chemical engineering are not required to take Course *4b*. Students who have not received credit in plant trigonometry on admission must elect Course *1a* in their first semester.

1a. Plane Trigonometry. *Two hours.* Both semesters.
Definitions of the trigonometric functions; principal relations between them; their application to the solution of triangles; use of trigonometric and logarithmic tables, applied problems.

1. Algebra and Analytic Geometry. *Four hours.* Both semesters.
Coördinates in the plane; the straight line; linear equations; determinants; permutations and combinations; the circle; complex numbers; quadratic and cubic functions and equations; polynomials.

2. Calculus and Analytic Geometry. *Four hours.* Both semesters.
Elements of the differential calculus; numerical equations; the parabola, ellipse, and hyperbola; the general equation of the second degree; applications of the derivative; differentiation of transcendental functions.

3. Calculus and Analytic Geometry. *Five hours.* Both semesters.
Tracing and discussion of curves; integration and its applications; solid analytic geometry.

4. Calculus and Differential Equations. *Five hours.* Both semesters.
Definite integrals and their application to the determination of lengths of arcs, areas, volumes, mass moments, moments of inertia, etc.; partial and total derivatives, infinite series. Elements of the solution of differential equations, with applications.

4a. Calculus. *Three hours.* Both semesters.
Definite integrals and their application to the determination of lengths of arcs, areas, volumes, mass moments, moments of inertia, etc.; partial and total derivatives; infinite series.

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4*b*. Calculus. *Two hours.* Both semesters.
Elements of the solution of differential equations, with applications.

36. Vector Analysis. *Three hours.* Second semester.

43. Integral Equations. *Two hours.* First or second semester.

57. Empirical Formulas and Graphical Methods I. *Two hours.* First semester.

58. Empirical Formulas and Graphical Methods II. *Two hours.* Second semester.

SUMMER SESSION OF 1921

Z. Solid Geometry. *For entrance.* Professor ————.

1*a*. Trigonometry. Elementary Course. Professor KARPINSKI.

1. Algebra and Analytic Geometry. *Four hours.* Assistant Professor HOPKINS.

2. Calculus and Analytic Geometry. *Four hours.* Professor RUNNING, and Assistant Professor POOR.

3. Calculus and Solid Analytic Geometry. *Five hours.* Professor FIELD, and Assistant Professors POOR and NELSON.

4*a*. Calculus. *Three hours.* Assistant Professor ROUSE.

4*b*. Differential Equations. *Two hours.* Assistant Professor HOPKINS.

58*s*. Emperical Formulas. *Two hours.* Professor RUNNING.

33*s*. Analytical Mechanics. *Two hours.* Professor FIELD.

MECHANICAL ENGINEERING

FIRST SEMESTER

1. Machine Drawing. *Two hours.* Professor WILSON, Assistant Professor MICKLE, Mr. GOOD, and Mr. LEGG.

2. Elements of Machine Design. *Three hours.* Professor WILSON, Assistant Professor MICKLE, and Mr. LEGG.

3. Heat Engines. *Four hours.* Professors ANDERSON and HAWLEY, Assistant Professor MICKLE, Mr. WATSON, and Mr. KEELER.

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4. Hydraulic Machinery. *Three hours.* Professor ZOWSKI, and Mr. JAGODZINSKI.

5. Thermodynamics. *Three hours.* Professor FESSENDEN.

6. Theory of Machine Design. *Four hours.* Professors ZOWSKI and WILSON.

7. Mechanical Laboratory. First Course. *Two hours.* Professor EMSWILER, Mr. WATSON, and Mr. KEELER.

8. Mechanical Laboratory. Second Course. *Two hours.* Professor EMSWILER, Mr. WATSON, and Mr. KEELER.

9. Power Plants. *Three hours.* Professor HAWLEY.

10. Theory of Machine Movements. *Two hours.* Professor WILSON.

11. Steam Boilers. *Three hours.* Professor FESSENDEN.

13. Steam Turbines. *Three hours.* Professor EMSWILER.

15. Internal Combustion Engines and Gas Producers. *Three hours.* Mr. GOOD.

17. Pumps and Compressors. *Three hours.* Professor ZOWSKI.

18. Heating and Ventilation. First Course. *Two hours.* Professor ANDERSON.

20. Mechanical Handling of Materials. *Two hours.* Professor HAWLEY.

20*a*. Design of Hoisting and Conveying Machinery. *Three hours.* Professor HAWLEY.

22. Mechanical Laboratory. Advanced Course. *Two* or *three hours.* Professor EMSWILER.

23. Hydraulic Laboratory. Advanced Course. *Two* or *three hours.* Professor ZOWSKI.

29. Gasoline Automobiles. *Three hours.* Assistant Professor LAY.

30. Automobile Engine. *Three hours.* Assistant Professor NICKELSEN.

31. Automobile Chassis. Assistant Professor NICKELSEN.

32. Automobile Testing. *Two hours.* Assistant Professor LAY.

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33. Advanced Automobile Testing and Research. Assistant Professor LAY.

[35. Scientific Shop Management. *Three hours.* Omitted first semester in 1919-1920.]

[36. Scientific Shop Management. Advanced Course. *Two* or *three hours, as arranged.* Omitted first semester in 1919-1920.]

[37. Special Topics on the Internal Combustion Engine. *Two hours.* Omitted 1919-1920.]

SECOND SEMESTER

1. Machine Drawing. *Two hours.* Professor WILSON, Assistant Professor MICKLE, and Mr. LEGG.

2. Elements of Machine Design. *Three hours.* Professor WILSON, Assistant Professor MICKLE, and Mr. LEGG.

3. Steam Engines and Other Heat Engines. *Four hours.* Professors ANDERSON and HAWLEY, Assistant Professor MICKLE, Mr. WATSON, and Mr. KEELER.

4. Hydraulic Machinery. *Three hours.* Professor ZOWSKI, and Mr. JAGODINSKI.

5. Thermodynamics. *Three hours.* Professor FESSENDEN.

6. Theory of Machine Design. *Four hours.* Professors ZOWSKI and WILSON.

7. Mechanical Laboratory. First Course. *Four hours.* Professor EMSWILER, Mr. WATSON, and Mr. KEELER.

8. Mechanical Laboratory. Second Course. *Two hours.* Professor EMSWILER, Mr. WATSON, and Mr. KEELER.

9. Power Plants and Power Transmission. *Three hours.* Professor HAWLEY.

9*a*. Design of Power Plants. *Three hours.* Professor HAWLEY.

10. Theory of Machine Movements. *Two hours.* Professor WILSON.

11*a*. Design of Steam Boilers. *Three hours.* Professor FESSENDEN.

12. Steam Reciprocating Engines. *Two hours.* Professor FESSENDEN.

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12*a*. Design of Steam Reciprocating Engines. *Three hours.* Professor ZOWSKI.

13. Steam Turbines. *Three hours.* Professor EMSWILER.

15. Internal Combustion Engines and Gas Producers. *Three hours.* Mr. GOOD.

15*a*. Design of Internal Combustion Engines. *Three hours.* Mr. GOOD.

16. Water Turbines. *Three hours.* Professor ZOWSKI.

16*a*. Design of Water Turbines. *Three hours.* Professor ZOWSKI.

17*a*. Design of Pumps and Compressors. *Three hours.* Professor ZOWSKI.

19. Refrigeration. *Two hours.* Professor FESSENDEN.

20. Mechanical Handling of Materials. *Two hours.* Professor HAWLEY.

20*a*. Design of Hoisting and Conveying Machinery. *Three hours.* Professor HAWLEY.

22. Mechanical Laboratory. Advanced Course. *Two* or *three hours.* Professor EMSWILER.

23. Hydraulic Laboratory. Advanced Course. *Two* or *three hours.* Professor ZOWSKI.

25. Heating and Ventilation. Second Course. *Two hours.* Professor ANDERSON.

25*a*. Design of Heating and Ventilating Systems. *Three hours.* Professor ANDERSON.

29. Gasoline Automobiles. *Three hours.* Assistant Professor LAY.

30*a*. Automobile Motor Theory and Design. *Three hours.* Assistant Professor NICKELSEN.

31*a*. Automobile Chassis Design. *Three hours.* Assistant Professor NICKELSEN.

32. Automobile Testing. *Two hours.* Assistant Professor LAY.

33. Advanced Automobile Testing and Research. *Two* or *three hours.* Assistant Professor LAY.

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35. Scientific Shop Management. *Three hours.* Professor BURSLEY.

36. Scientific Shop Management. Advanced Course. *Three hours.* Professor BURSLEY.

[37. Special Topics on the Internal Combustion Engine. *Two hours.* Omitted in 1919-1920.]

SUMMER SESSION OF 1921

1. Machine Drawing. *Two hours.* Professor WILSON.

2. Elements of Machine Design. *Three hours.* Professor WILSON.

3. Steam Engines and other Heat Engines. *Four hours.* Professor HAWLEY.

4. Hydraulic Machinery. *Three hours.* Assistant Professor SHERZER.

5. Thermodynamics. *Three hours.* Professor EMSWILER.

7. Mechanical Engineering Laboratory. *Two hours.* Mr. WATSON.

8. Mechanical Engineering Laboratory. Second Course. *Two hours.* Mr. WATSON.

17*a*. Design of Centrifugal Pumps. *Three hours.* Assistant Professor SHERZER.

23. Hydraulic Machinery. *Credit to be arranged.* Assistant Professor SHERZER.

MILITARY SCIENCE AND TACTICS

FIRST SEMESTER

Coast Artillery

1. Infantry. Fundamental subjects in military training. *One hour.* Assistant Professor SHIPPAM.

3. Minor Tactics. Combat problems for small units. Artillery material. *One hour.* Professor ARTHUR.

5. Orientation. Topographical operations in locating and laying artillery. *Two hours.* Assistant Professor SHIPPAM.

7. Gunnery. Problems of Artillery in the Field. *Two hours.* Professor ARTHUR.

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Signal Corps

11. Infantry and Elementary Training. *One hour.* Assistant Professor SHIPPAM.

13. Offensive Action of Small Units. Field Radio Sets. *One hour.* Professor ARTHUR, and Mr. ————.

15. Radio Telegraphy and Telephony. *Two hours.* See E. E. 22.

17. Communication Engineering. *Two hours.* See Physics 33.

SECOND SEMESTER

Coast Artillery

2. Military Hygiene. Sanitation. Interior Guards. *One hour.* Professor ARTHUR.

4. Topography. Small Arms. Artillery Material. *One hour.* Assistant Professor SHIPPAM.

6. Motor Transportation. See M. E. 29.

8. Military Law. Field Engineering. Administration. *Two hours.* Professor ARTHUR.

Signal Corps

12. Hygiene. First Aid. Guard Duty. *One hour.* Professor ARTHUR.

14. Map Reading. Small Arms. Telegraphy and Telephony. *One hour.* Assistant Professor SHIPPAM, and Mr. ————.

16. Signal Communications. Organization. *Two hours.* Assistant Professor SHIPPAM.

18. Military Law. Hippology. Administration. *Two hours.* Professor ARTHUR.

SUMMER SESSION OF 1921

CAMPS

Coast Artillery

1. Basic. Fort Monroe, Va. *Six weeks.* Not prerequisite to graduation. Practical and laboratory work in Infantry Drill, Artillery Drill, Artillery Material, Target Practice, Orientation, Interior Guard Duty, Motor Transportation, Small Arms Firing, Signaling, Physical Training, and Swimming. *Thirty-five hours per week.*

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2. Advanced. Fort Monroe, Va. *Six weeks.* Prerequisite to graduation. Instructional or command positions or advanced work in subjects of basic camp and practical work in Equitation, Fire Control, Artillery Tactics, and Gunnery. *Thirty-five hours per week.*

Signal Corps

11. Basic. Camp Alfred Vail, N. J. *Six weeks.* Not prerequisite to graduation. Practical and laboratory work pertaining to the Signal Corps.

12. Advanced. Camp Alfred Vail, N. J. *Six weeks.* Prerequisite to graduation. Advanced practical work pertaining to the Signal Corps.

MINERALOGY AND PETROGRAPHY

All courses offered by this department are given in the Mineralogical Laboratory which is located in the northeast corner of the Natural Science Building. The mineral collections, Room 222, are open for inspection daily whenever the University is in session from 9 to 12 A. M. and 2 to 4 P. M.

Courses 1, 2, 16, 17, and 17*a* are beginning courses. Course 1 is designed to meet the needs of students desiring an elementary knowledge of Mineralogy, and may be followed by Courses 4 and 5, or 9. Students desiring a more comprehensive beginners' course are advised to elect Course 2, which serves as the basis for the more advanced work of the department. Course 17 is designed to give a general knowledge of gems and gem minerals, and is open to all students, no previous training in mineralogy or the sciences being necessary. Students desiring a more intimate knowledge of gems should also elect the laboratory work, designated as Course 17*a*. Students of Chemistry and Chemical Engineering are advised to take Courses 2 and 5, or Courses 1, 4, and 5. Course 16 is designed especially for students of Architecture. A description of all courses offered in this department may be found on page 309.

FIRST SEMESTER

1. Elements of Mineralogy. Lectures and Laboratory work. *Two hours.* Professor KRAUS, Assistant Professor PECK, and Mr. SLAWSON.

   This course includes the elements of crystallography, physical and chemical properties, occurrences, uses, and determination of the more common minerals. For this course a knowledge of elementary inorganic chemistry is necessary.

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2. General Mineralogy. Lectures and laboratory work. *Five hours.* Professors KRAUS and HUNT, and Assistant Professor PECK.
Students who have successfully completed Course 1 may elect this course as Course 2*a* and receive *three hours credit.*
Principles of crystallography, physical and chemical properties, origin, formation, decomposition, distribution, uses, and determination of the more important minerals. Prerequisites, Chemistry 2 and 3.

4. Determinative Mineralogy. Laboratory work. *Two hours.* Professor HUNT.
Intended for students who have completed Course 1 and wish to become more proficient in the determination of minerals by means of their physical characters.

5. Qualitative Blowpipe Methods. *Two hours.* Professor HUNT.
This course involves the use of the blowpipe reactions upon charcoal and plaster tablets, as well as other chemical methods useful in the determination of minerals. Prerequisites, Course 2 or Courses 1 and 4 in Mineralogy, or Courses 3*a* and 3*b* in chemistry.

6. Physical Crystallography. Lectures and laboratory work. *Four hours.* Three lectures and three hours laboratory work a week, to be arranged. Professor KRAUS, and Assistant Professor PECK.
This course involves a critical study of the various properties of crystals including the use of the poralizing microscope and other crystallographic-optical instruments. Must be preceded by Course 2 and, if possible, by Course 3.
Students desiring to study only the optical properties of crystals may elect this course as 6*a* and receive *three hours credit.*

9. Lithology. Lectures and laboratory work. *Two hours.* Professor HUNT, and Mr. SLAWSON.
The lectures include, aside from a review of the rock-forming minerals, a discussion of the origin, modes of occurrence, alterations, methods of determination, and uses of the more important rocks. In the laboratory the student is required to determine by means of the macro-physical properties a large number of rock specimens. Field excursions will also be made in order to acquire facility in the rapid determination of rocks in the field. Prerequisites, Mineralogy 1 and Geology 1.

10. Petrography. Lectures and laboratory work. *Three, four,* or *five hours.* Professor HUNT.
After reviewing the optical characters and methods of investigation of crystals, the various properties of the important

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rock materials are discussed in detail. The mineralogical and chemical composition, texture, genesis, forms of occurrence, and metamorphism of rocks are then studied. The laboratory work is devoted to the systematic study of rock minerals and rocks with the aid of the polarizing microscope. Prerequisites, Mineralogy 2 or 1 and 4, 6 or 6*a*, and 9.

SECOND SEMESTER

1. Elements of Mineralogy. Lectures and laboratory work. *Two hours.* Professor KRAUS, Assistant Professor PECK, and Mr. SLAWSON.

This course includes the elements of crystallography, physical and chemical properties, occurrence, uses, and determination of the more common minerals, and also an introduction to the use of the polarizing microscope. For this course a knowledge of elementary inorganic chemistry is necessary.

4. Determinative Mineralogy. Laboratory work. *Two hours.* Professor HUNT, and Mr. SLAWSON.

Intended for students who have completed Course 1 and wish to become more proficient in the determination of minerals by means of their physical character.

9. Lithology. Lectures and laboratory work. *Two hours.* Professor HUNT.

The lectures include, aside from a review of the rock-forming minerals, a discussion of the origin, modes of occurrence, alternations, methods of determination, and uses of the more important rocks. In the laboratory the student is required to determine by means of the macro-physical properties a large number of rock specimens. Field excursions will also be made in order to acquire facility in the rapid determination of rocks in the field. Prerequisites, Mineralogy 1, and Geology 1.

11. Petrography. Lectures and laboratory work. *Three, four,* or *five hours.* Professor HUNT.

This is a continuation of Course 10.

12. Quantitative Blowpipe Methods. Reading and laboratory work. *Two hours.* Professor HUNT.

Practice in assaying by blowpipe methods of various kinds of ores, especially those of gold, silver, copper, and lead. Prerequisite, Course 5.

16. Mineralogy and Lithology. *Three hours.* Professor HUNT, and Mr. SLAWSON.

This course is designed especially for students in architecture. Open to others only by special permission.

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The first half of the course discusses the physical and chemical properties, uses, and determination of the common rock forming minerals, and of those ores from which the metals and materials commonly used for building purposes are obtained. The second half is devoted to a discussion of the origin, modes of occurrences, description and uses of the common rocks, with special emphasis upon those used for structural and ornamental purposes.

For this course a knowledge of elementary inorganic chemistry is necessary.

17. Gems and Precious Stones. Lectures and demonstrations. *Two hours.* Professor KRAUS.

This course discusses the general properties, occurrence, determination, and history of the various minerals used as gems and gem minerals. The various methods of distinction, especially for imitations and synthetic gems, will also be considered. No previous training in mineralogy or the sciences is required, although an elementary knowledge of chemistry and physics is highly desirable.

17*a*. Gems and Precious Stones. Laboratory work. *One hour.* Professor KRAUS, and Assistants.

Students are given an opportunity to familiarize themselves with the various methods used in the scientific determination of gems and gem minerals. Three hours a week in the laboratory to be arranged. Must be accompanied or preceded by Course 17.

SUMMER SESSION OF 1921

(See College of Literature, Science, and the Arts.)

MODERN LANGUAGES

Professors WAIT and LEE, Assistant Professors ADAMS, KENYON, and WILD, Mr. ALBALADEJO, Mr. JOBIN, Mr. BRITTON, Mr. GAISS, Mr. MCGUIRE, Mr. DRISCOLL, and Mr. LUZUNARIS.

GERMAN

The aim of the instruction in German is to help the student to a reading and speaking knowledge of the language. Special attention is paid to scientific and technical literature. Elective courses are offered for the accommodation and benefit of students who have the time and inclination to carry their language work beyond the limits of the required courses.

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BOTH SEMESTERS

1. Elementary Course. Grammar and reading with constant practice in writing and speaking German. *Four hours.*

2. Elementary Course continued. *Four hours.*

3. Intermediate German. *Four hours.*

4. German Scientific and Technical Literature. *Four hours.*

9. German Chemical Reading. *Two hours.* (First semester only.) Professor LEE.
This course is equivalent to Chemistry 20.

SUMMER SESSION OF 1921

1*as*. Beginners' Course. *Four hours.* Professors WINKLER and DIEKHOFF.

FRENCH

The aim of the instruction in French is to help the student to a reading and speaking knowledge of the language. Elective courses are offered for the accommodation and benefit of students who have the time and inclination to carry their language work beyond the limits of the required courses.

BOTH SEMESTERS

1. Elementary Course. Grammar and reading, with constant practice in writing and speaking French. *Four hours.*

2. Elementary Course continued. *Four hours.*

3. Intermediate French. *Four hours.*

4. Advanced French. *Four hours.*

5. Advanced Composition and Conversation. *Two hours.* Mr. JOBIN.
This course may be taken only after completing French 4 or its equivalent.

6. French Literature in English. An outline of the development of French literature. Lectures, assigned readings, and reports. *Two hours.* Assistant Professor ADAMS.
This course is intended as a general culture course. No knowledge of French is required. Open to students who have completed the regular language requirements.

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9. French Chemical Reading. *Two hours.* (Second semester only.) Equivalent to Chemistry 20*a*. Professor LEE. (Second semester only.)

SUMMER SESSION OF 1921

1*s*. Beginners' Course. *Six hours.* Assistant Professor KENYON.

1. Beginners' Course. *Four hours.* Professor WAIT.

SPANISH

The courses in Spanish are offered chiefly to meet the demands of students looking forward to a professional career in countries where Spanish is the prevailing medium of communication.

Opportunity for advanced work in Spanish is offered to students who desire to make themselves specially proficient in this language.

BOTH SEMESTERS

1. Elementary Course. Grammar and reading, with constant practice in writing and speaking Spanish. *Four hours.*

2. Elementary Course continued. *Four hours.*

3. Reading, Conversation, and Correspondence. *Four hours.*

4. A Continuation of Course 3. *Four hours.*

5. Advanced Composition and Conversation. *Two hours.* Mr. ALBALADEJO.

   This course may be taken only after completing Spanish 4 or its equivalent.

6. Spanish Literature in English. An outline of the development of Spanish literature. Lectures, assigned readings, and reports. *Two hours.* Assistant Professor KENYON.

   This course is intended as a general culture course. No knowledge of Spanish is required. Open to students who have completed the regular language requirements.

SUMMER SESSION OF 1921

(See College of Literature, Science, and the Arts.)

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NAVAL ARCHITECTURE AND MARINE ENGINEERING

FIRST SEMESTER

1. Naval Architecture. Structural design. Lectures and recitations. *One hour.* Professor SADLER.

3. Naval Architecture. Stability and rolling of ships and preliminary design. Lectures and recitations. *Three hours.* Professor SADLER.

5. Naval Architecture. Mould loft and structural drawing. *Two hours.* Assistant Professor LINDBLAD.

6. Naval Architecture. Ship drawing and design. *Three hours.* Professor BRAGG, and Assistant Professor LINDBLAD.

8. Marine Boilers. Lectures and recitations. *One hour.* Professor BRAGG.

9. Marine Engines. Lectures and recitations. *Two hours.* Professor BRAGG.

10. Marine Boiler Design. *Three hours.* Professor BRAGG, and Assistant Professor LINDBLAD.

SECOND SEMESTER

2. Naval Architecture. Ship calculations and strength. Lectures and recitations. *Three hours.* Professor BRAGG.

4. Naval Architecture. Resistance and propulsion of ships, and screw propellers. Lectures and recitations. *Three hours.* Professor SADLER.

5. Naval Architecture. Mould loft and structural drawing. *Two hours.* Assistant Professor LINDBLAD.

7. Naval Architecture. Ship drawing and design. *Three hours* Professor SADLER, and Assistant Professor LINDBLAD.

9. Marine Engines. Lectures and recitations. *Two hours.* Professor BRAGG.

11. Marine Engine Design. *Two* or *three hours.* Professor BRAGG.

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BOTH SEMESTERS

Primarily for Graduates.

12. Experimental Tank Work. *One, two* or *three hours.* Professors SADLER and BRAGG.

13. Ship and Engine Specifications. *One* or *two hours.* Professor SADLER.

14. Shipyard Plants. *One hour.* Professor SADLER.

15. Naval Architecture. Advanced reading. *Three hours.* Professor SADLER.

16. Advanced Drawing. *Three to five hours.* Professor SADLER.

17. Marine Engines. Advanced reading. *Three hours.* Professor BRAGG.

18. Marine Engines. Advanced drawing and design. *Three to five hours.* Professor BRAGG.

PHYSICS

Professors RANDALL, SMITH, HENDERSON, WILLIAMS, COLBY, Assistant Professors RICH, SLEATOR, and LINDSAY, Dr. KENT, Dr. SAWYER, Dr. SHELDON, Dr. FAZEL, Mr. ST. PETER, Mr. BECKER, Mr. PARSONS, Mr. CORK, Mr. GEIGER, Mr. BABBITT, Mr. COOLEY, Mr. GUNN.

Z. Physics for Admission. This course is intended for students who have not presented the required unit of entrance physics. It is required for admission to Courses 1 and 1E. No credit will be allowed for this course. Four times a week, first semester. *Hours to be arranged.* Mr. CORK.

1. General Physics: Mechanics, Sound and Heat. Lectures and recitations four times a week, and laboratory work. Both semesters. Professor RANDALL, Assistant Professor RICH, Professor COLBY, and Assistants.

1*a*. Physics Problems, once a week. Both semesters. Assistant Professor SLEATOR.

Students in Architecture 1 and 2 elect 1 and 1*a* for *four hours* credit.

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1E. Mechanics, Sound and Heat. Lectures, recitations, and laboratory work. *Five hours.* Both semesters. Professor WILLIAMS, Assistant Professor RICH, and Assistants.

For Courses 1 and 1E a knowledge of plane trigonometry is indispensable. No student is admitted to the class who has not had the preparatory course in Physics.

In Course 1E at least half the semester is devoted to elementary Mechanics; the remainder of the time to Sound and Heat, all with experimental illustrations. All members of the class have one period a week in the laboratory.

2. General Physics: Magnetism, Electricity, and Light. Lectures and recitations, four times a week, and laboratory work. Both semesters. Professor RANDALL, Assistant Professor RICH, Professor COLBY, and Assistants.

2*a*. Physics Problems, once a week. Both semesters. Assistant Professor SLEATOR.

Students in Architecture 1 and 2 elect 2 and 2*a* for *four hours* credit.

2E. Magnetism, Electricity and Light. Lectures, recitations and laboratory work. *Five hours.* Both semesters. Professor WILLIAMS, Assistant Professor RICH, and Assistants.

Course 2E must be preceded by Course 1E and by Course 2E in chemistry or an equivalent. It is a continuation of Course 1E and takes up the fundamental phenomena and laws of these subjects, with ample class illustrations. Laboratory work as in Course 1E.

Course 1E and 2E are required from all engineering students. Students transferring their credits from the College of Literature, Science, and the Arts will be required to offer Courses 1, 1*a*, and 2, 2*a*, as equivalents of Course 1E and 2E.

5E. Electrical Measurements. Lectures and laboratory. *Two hours.* Both semesters. Professor SMITH.

In the class work the principles of electrical behavior are critically studied and discussed. The laboratory exercises are designed to illustrate and emphasize these principles and to give the student some personal experience in the careful use of electrical measuring instruments. The course includes the modern methods of measuring current, resistance, electromotive force, capacity, inductance, and hysteresis of iron, and the calibration of the instruments employed.

Course 5E must be preceded by 1E and 2E, or their equivalents. A knowledge of calculus is also desirable.

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11. Laboratory Work in Heat. *Three hours.* First semester. Dr. KENT.

An experimental course accompanied by lectures, covering the fundamental principles of heat and the methods of heat measurements. The course will meet the needs of either technical students, or those specializing in Physics.

14. Electron Theory and Radioactivity. *Two hours.* Lectures and laboratory. Professor SMITH.

The laboratory work deals largely with radioactive substances. The distinguishing characteristics of alpha rays, beta rays, and gamma rays are studied, and the half-life periods of several substances are determined by each student.

15, 16. Electrochemical Physics. Class and laboratory work. *Two hours.* Throughout the year. Professor HENDERSON.

Course 15 must be preceded by Course 2E in Physics and Course 2E in Chemistry. A course in qualitative analysis is also desirable.

This course is designed, (a) to meet the needs of those preparing to teach physics and chemistry, (b) to furnish a basis for the application of electrochemical principles to practical problems in chemistry and electricity, and (c) to prepare for research in electrochemical physics.

18. Measurement of High Temperatures. *Three hours.* Second semester. Dr. KENT.

An experimental course accompanied by lectures, covering the theory and practice of the present methods of high temperature measurements. The work involves the use of thermocouples, resistance thermometers, and the modern types of optical and total radiation pyrometers. For technical students and those specializing in Physics.

20. Architectural Acoustics. *Two hours.* Assistant Professor RICH.

Lectures, with illustrative problems on sound transmission, distribution, and absorption, and an experimental study of the acoustical properties of certain rooms.

24. Theory of Light. *Two hours.* Assistant Professor LINDSAY.

The essential phenomena of optics, including interference and diffraction, dispersion, absorption, polarization, and double refraction.

25. Theory of Heat. *Two hours.* First semester only. Professor RANDALL.

Course 25 must be preceded by Course 2E.

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27, 28. Mathematical Theory of Electricity and Magnetism. *Three hours.* Throughout the year. Professor COLBY.

This course must be preceded by Course 2E. A knowledge of the calculus is required. It is devoted to a mathematical as distinguished from an experimental study of electrical phenomena.

33. Vacuum Tubes in Radio Communication. *Two hours.* Professor WILLIAMS.

Lectures and laboratory work. The theory of the transmission of electricity through gases will be treated in this course, together with a study of the different types of tubes used in radio work. The characteristics of such tubes will be determined experimentally and the electric circuits employed in their use will receive considerable attention.

Prerequisites: Course 5 in Physics and the Calculus.

37. German Reading. *Two hours.* First semester. Assistant Professor LEE.

In this course the subject of Physics is studied in German to acquaint the student with the technical terms used in modern German physics.

This course may be taken only by such students as convince the instructor of their satisfactory preparation.

Course 37 is continued in the second semester as Course 38, *two hours.*

SUMMER SESSION OF 1921

Course Z intended for students preparing for entrance to the College of Engineering, and Courses 1, 1E, 2, 2E, 1*a*, 2*a*, 5, 5E, 6, 6E, 9, 12, 14, 30, 31, as described for the regular session, will be offered in the Summer Session of 1921.

SHOP PRACTICE

All courses in shop practice are under the direction of Professor AIREY, Acting Superintendent of Shops. Instruction is given in the various branches by special shop assistants.

The shop courses consist of actual practice in the shops, together with class-room recitations for which outside preparation is made from text-books and oral instruction. Courses 1 to 4 may be continued by advanced students as Courses 1*a* and 4*a*. Special arrangements are made for students who desire to take more advanced shop courses with a view of preparing themselves for teaching these subjects.

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BOTH SEMESTERS

1. Wood Shop Practice. *Two hours.*
2. Forge Shop Practice. *Two hours.*
3. Foundry Practice. *Four hours.*
4. Machine Shop Practice. *Four hours.*

SUMMER SESSION OF 1921

1. Wood Shop. *Two hours.* Mr. YEATMAN.
2. Forge Shop. *Two hours.* Mr. TELFER.
3. Foundry. *Four hours.* Mr. HASTINGS.
4. Machine Shop. *Four hours.* Mr. SWEET.

SURVEYING

Courses 1, 2, and 3 are designed primarily for students of Civil Engineering. Students of Landscape Design are now required to take these courses and they are frequently elected by others who desire a thorough training in the elementary theory and practice of surveying. All courses are given on the campus at Ann Arbor, except Course 3, which embraces the field work at Camp Davis. Course 4 is offered for the convenience of students who desire a brief course in the use of instruments. All students of engineering, except those of the Civil Engineering group, are required to take this course. It is offered both semesters and during the summer session. Courses 12 and 13 are designed for students of Forestry. The work prescribed therein runs parallel to Courses 1 and 2 in so far as possible. When students have completed Courses 12 and 13 they are qualified to elect Course 3.

Course 3 is given during the regular summer session, beginning soon after the first of July and ending a few days after the 20th of August. The camp is conducted on a practical basis and the methods employed are such as are generally applied in the field. The student is able to secure different work for practically every day of the session, however, so that the training obtained is more varied than an engineer would receive in a period covering many years of actual service in the field. The exercises embrace railroad surveys, triangulation surveys, sounding work, earthwork, azimuth observations and computations, adjustments of instruments, stadia surveys, canal surveys, the measurement of base lines, office work, etc.

Students cannot successfully carry the elementary courses in surveying until they have completed a thorough course in plane trigo-

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nometry. The student has less difficulty after he has completed courses in analytic geometry and higher algebra. A knowledge of physics and calculus is helpful. Course 3E Astronomy should precede Course 3.

1. Elementary Surveying. Lectures. Text-book and field practice. *Three hours.* Four sections. Professors JOHNSTON, MERRICK, and CAREY, Assistant Professors BRODIE, BOUCHARD, and MITCHELL, and Mr. MCFARLAN.
   Course 1 is given only during the first semester, field work being prosecuted until about the first of December.

2. Continuation of Course 1. *Four hours.* Course 2 is given during the second semester only.

3. Summer Work at Camp Davis, described above.

BOTH SEMESTERS

4. Use of Instruments. Four sections. *Two hours.*
   Course 4 is also offered during the summer session.

5. Least Squares. *Two hours.* Professor JOHNSTON.

6. Geodesy. Lectures. Reading. *Three hours.* Professor JOHNSTON.

7. Municipal Surveying. *Two hours.* Assistant Professor BOUCHARD.

8. The Surveyor and the Public. *Two hours.* Professor JOHNSTON.

[9. Railway Surveying. *One hour.* Associate Professor MERRICK. Omitted in 1918-1919.]

10. Engineering Photography. *Two hours.* Assistant Professor BRODIE.

12. Surveying and Drawing, Elementary, for Students of Forestry. *Four hours.* Associate Professor CAREY. First semester only.

13. Continuation of Course 12, for Students of Forestry. *Four hours.* Associate Professor CAREY. Second semester only.

SUMMER SESSION OF 1921

Course 4 is offered at Ann Arbor, and Course 3 at Camp Davis, Douglas Lake, Cheboygan County. Professor C. T. JOHNSTON, and Assistant Professor BOUCHARD.

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COLLEGE OF ARCHITECTURE

EQUIPMENT

The College of Architecture is housed in commodious quarters on the main floor of the Engineering building, immediately adjoining the library. The drafting rooms are well lighted and provided with drafting tables of special design. On the walls are hung a number of valuable original competition and measured drawings. The free-hand drawing room is situated on the top floor at the north end of the Engineering building. It is about sixty feet square, is lighted by means of windows and a north skylight, and is fully equipped for the instruction in free-hand drawing, pen and ink, water color, and drawing from life. There is a comprehensive collection of plaster casts of decorative and architectural form, pottery and textiles for painting from still life and several original drawings in pencil, color and pencil, pen and ink by D. A. Gregg, H. G. Ripley, and others. The architectural library is housed with the engineering library. It consists of a large amount of carefully selected reference and illustrative materials, and is made up of the standard books, about 1,800 volumes, portfolios of plates, photographs, and about 10,000 lantern slides. The leading architectural journals are also kept on file.

PROGRAMS OF STUDY

Three four-year curricula or programs of study are offered. In each of these provision is made for the essentials of a liberal education,—language, mathematics, science, and fine arts—for cultural electives, and for as much specific training in drawing, architectural design and history, construction, and building equipment as seems permissible during a period of four years.

Program I provides a general curriculum; in Program II, architectural design receives greater emphasis; while in Program III, advanced construction and the mechanical equipment of buildings are given a relatively large amount of time, particularly during the fourth year. The first year is practically identical for the four-year programs while the students in all these groups share the same classes in architecture during the first three years.

There is also a two-year program for special students, open under certain conditions to experienced architectural draftsmen; college graduates may also enter as special students.

A certificate is awarded upon the completion of the two-year program.

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SCHOLARSHIPS IN ARCHITECTURE

There are at present two scholarships for students of architecture, intended primarily for those just entering college. Preference is given to experienced architectural draftsmen and to students showing artistic ability.

NATURE OF COURSES

Architectural Design.—In the courses in Architectural Design the students work out, in the drafting room, designs for a great variety of buildings, ranging from a small house to large public buildings, problems of a practical character being interspersed with more ideal ones. The aim throughout these courses, of which there are eight offered, is to develop the imagination, creative power, ability to work out the organism of a building and skill in the clear and artistic presentation of the drawings.

The courses in Architectural Design are grouped as follows: Courses 4 and 5, Elementary Design; Courses 6 and 7, Intermediate Design; Courses 8, 9, and 10, Advanced Design; Courses 30 and 31, Graduate Design. Students must complete the requirements of one group before proceeding to the next. Students of average ability are able to complete this work in the usual number of years while those of unusual ability may do so in a shorter period.

In the course in *Allied Arts of Design,* designs are made for a piece of furniture, decorative glass, metal, and mosaic and of other objects or features commonly used in connection with architecture.

Architectural Construction.—The work in construction continues through three years and is conducted by means of lectures, quizzes, text-books, visits to buildings, and the preparation of working drawings. The character of building materials, their practical and artistic possibilities and the methods of present building practice are studied. The drawing work of the courses in construction begins with the making of working drawings of a small building. This includes the framing plans of the floors, walls, and roof, and full-size details of some essential portions. This is followed by the working drawings for a larger building of heavy construction and involves foundations, masonry walls, piers, columns, floors, roof, and details. This in turn, is followed by steel and re-inforced concrete construction, in the course of which girders, columns, trusses, and other structural work of a high, fire-proof building are designed. A course in the testing of materials is given in the senior year. Specifications are discussed in connection with the work in construction.

The courses in structural mechanics, strength and resistance of materials, testing of materials, and advanced construction or structural design are studied under specialists and given partly by the College of Architecture and partly by the departments of Engineering Mechanics and Civil Engineering.

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Heating and Ventilation.—The course in heating and ventilation of buildings is given by the department of Mechanical Engineering.

Building Sanitation.—In this course in *Building Sanitation* the principles are studied which should guide the design and installation of drainage and pumping systems.

History of Architecture.—In these courses the technical and artistic development of the art of building is traced from earliest times to the present day. The causes and influences which helped mould the various modes of building are analyzed and wherever possible demonstrated by means of the stereopticon. Many of the important buildings of the world are fully illustrated and critically studied, the student thus gaining an appreciation of the finest achievements of his art. Not only are the buildings studied in their larger aspects, but also in many of their details of construction, form, and detail. Historic ornament is taken up with the architecture of the various periods, as also are decorative sculpture and color.

In addition to the above all architectural students elect one or more courses in the history of art given by the department of Fine Arts in order to acquaint them with the development and masterpieces of painting and sculpture.

Free-hand Drawing.—Pen and Ink Rendering; Water Color Painting.—Considerable attention is devoted to free-hand drawing by students of Architecture. They begin drawing from simple geometrical solids involving the accurate representation of form in line and light and shade; simple decorative, natural and architectural, forms are next drawn, after which portions of the figures, the hand, foot, head, etc., are drawn from cast (Elementary Antique); then the entire figure is drawn from cast (Advanced Antique), after the satisfactory completion of which follows drawing from the living model.

Throughout this discipline, in the observation and artistic representation of line, form, proportion, light and shade, the aim is to develop in the student the power of free artistic expression. The student is advanced as rapidly as his progress warrants. The pencil, charcoal, and monochrome wash are used. A special course is provided for Architectural students in rendering in pen and ink. The instruction considers the character of such drawings necessary for reproduction. A course in painting in water color from still life is also required of students in Architecture, but may not be taken without first completing Courses 21 and 22 in Drawing, or their equivalent. Rendering in wash and color is carried on throughout the courses in design.

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REQUIREMENTS FOR GRADUATION

The Degree of Bachelor of Science in Architecture

To earn the degree of Bachelor of Science in Architecture, the student must secure *one hundred and forty hours of credit** in a prescribed curriculum, as given below, four hours of which must be earned by four months' practical experience in an architect's office. A time limit is not set, but four years are usually needed for the work required for the degree.

Candidates for degrees in Architecture and in Architectural Engineering enroll in the College of Architecture upon entering the University. They elect one of the three four-year programs of study, which are substantially identical for the first year.

HOURS CREDIT REQUIRED IN THE THREE FOUR-YEAR PROGRAMS AND IN THE TWO-YEAR PROGRAM FOR SPECIAL STUDENTS IN ARCHITECTURE

One hour of credit represents ordinarily about three hours of actual work during each week of one semester.

ARCHITECTURE:	I	II	III	Spl.
Elements of design	3	3	3	..
Architectural design	31	37	17	23
Allied arts design	3	3	..	..
History of architecture	8	8	6	8
Office work	4	4	4	..
CONSTRUCTION:				
Structural mechanics	6	6	7	..
Roofs and bridges, and framed structures	..	..	5	..
Construction (elementary)	2	2	2	2
Structural design (steel)	5	5	2	..
Masonry and reinforced concrete	4	4	5	..
Testing materials	..	..	2	..
Chemistry of materials	..	..	3	..
Surveying	..	..	2	..
BUILDING EQUIPMENT:				
Building sanitation	1	1	1	1
Heating and ventilation	2	2	2	2
Heat engines	..	..	4	..

* One credit hour indicates for each week during one semester one recitation or lecture with two hours of preparation or three hours of drawing or laboratory work.

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DRAWING:				
Free-hand drawing	10	10	6	6
Water-color painting	2	2	..	2
Descriptive geometry and shades and shadows	3	3	3	1
Perspective and stereotomy	2	2	2	2
SCIENCE:				
Mathematics	13	4	18	..
Physics	4	4	10	..
Acoustics	2	2	..	..
Chemistry	..	...	5	..
Geology or Mineralogy	3	3	3	..
LANGUAGE:				
English	6	6	6	..
French or German	12	12	12	..
GENERAL:				
Business Administration	3	3	..	..
History of art	3	3	..	3
Landscape Design	..	3	..	..
Cultural and free electives	8	8	10	10
	140	140	140	66

ARCHITECTURE

Architectural Design

In the following courses in Architectural Design problems are assigned to be worked out in the drafting-room. Lectures are given from time to time bearing on the type of building then being designed. Study of the requirements of various classes of buildings and of the artistic possibilities of building materials, training of the student in composition in plan, section, elevation and perspective, in accurate draftsmanship and rendering in line, black-and-white, and color.

Courses 4 and 10 inclusive constitute a progressive series of problems in architectural planning and design, advancing from the small building to the more important classes of buildings and to the group problem. The courses must be taken in the order given.

FIRST SEMESTER

1. Elements of Design. *Three hours.* Assistant Professors BENNETT and LOOMIS.

An introductory course to the field of artistic design, decorative and architectural. Principles of design, and the possibilities in

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design of line, color and form. Architectural elements, their function and form; the influence of material. The pier, lintel, arch, wall, openings; the plan and roof.

Methods of indication; rendering, lettering. Drawing exercises and lectures. This course or its equivalent must precede all architectural design courses. It should be accompanied or preceded by Drawing 4*a* and 21.

4. Architectural Design. *Three hours.* Mr. O'DELL.
A continuation of Course 1; the orders and simple problems in design. Illustrated lectures and drawing exercises.
Course 4 must be preceded by Course 1, Drawing 4*a* and 21.

5. Architectural Design. *Four hours.* Professor BOYNTON.
The small ensemble. Course 5 should be preceded by Drawing 5*a* and 22, and by Courses 4 and 21 in Architecture.

6. Architectural Design. *Four hours.* Assistant Professor LOOMIS.
This course, a continuation of Course 5, should be preceded by Architecture 5 and 22.

7. Architectural Design. *Six hours.* Professor ROUSSEAU.
Plan problems.
This course must be preceded by Architecture 6.

8. Architectural Design. *Six hours.* Professor ROUSSEAU.
Plan problems.
This course must be preceded by Architecture 7.

9. Architectural Design. *Six hours.* Professor ROUSSEAU.
Advanced plan problems.
This course must be preceded by Architecture 8.

10. Architectural Design. *Eight hours.* Professor ROUSSEAU.
Advanced plan problems.
This course must be preceded by Architecture 8 or 9.

30. Architectural Design. *Hours to be arranged.* Professor ROUSSEAU.
Special problems in planning and design. Must be preceded by the equivalent of Architecture 10.

Technical and Historical Development of Architecture and Design

For students in Architecture, Courses 12, 13, and 14 assume some knowledge of history, drawing, and design; they should be elected in the order given. The purpose of these courses is to study the historical conditions, building materials and methods, planning and de-

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sign, as well as the sculptured and painted decoration and ornament of the mort important and significant works of architecture. The courses are carried on by means of illustrated lectures, conferences, drawing exercises and research.

13. Gothic, Renaissance and Modern Architecture. *Three hours.* Professor LORCH.

Should be preceded by Architecture 12.

The Gothic, Renaissance and Modern Architecture of European countries, and Architecture in the United States.

14. Architectural History Research. *Two hours.* Professor LORCH.

Must be preceded by Courses 12 and 13 and one year of architectural design.

An intensive study of the architecture of a specific period or country, and the making of one or more designs embodying the results of this study.

[15. General Course in the History of Architecture. *Two hours.*

The aim of this course is to give students seeking a liberal culture a survey of the development of the art of building. The temples, cathedrals, palaces and other characteristic monuments of the ancient, medieval, renaissance and modern styles, their design, sculpture and painted decorations will be studied by means of lectures illustrated by the stereopticon, and collateral reading. This course is open to all students in the University, but cannot be counted towards graduation in architecture.

For students of art and archæology desiring a more intensive study of the technical and historical development of architecture, Courses 11, 12, 13, and 14 are recommended. Omitted in 1919-1920.]

18. Architectural Composition. *One hour.*

This course supplements the courses in architectural design by a series of illustrated lectures.

33. Architectural History. Professor LORCH.

A thesis on the architectural work of a period or on a particular monument. Must be preceded by the equivalent of Architecture 12, 13, and 14.

Building Construction and Equipment

19. Architectural Mechanics. *Three hours.* Assistant Professor NEWMAN.

The principle of equilibrium. Analysis of stresses in simple frames by graphic and algebraic methods. Must be preceded by Mathematics 1E and Physics 1.

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20. Architectural Mechanics. Advanced Problems in Statics. Strength of Materials. *Three hours.* Professor McConkey.
Must be preceded by Architecture 19.

24. Building Sanitation. *One hour.* Professor McConkey.
Plumbing and Drainage. A study of materials, fixtures, methods of assembling and modes of arrangement. Lectures and drawing.
Prerequisites: Architecture 4 and 21.

22. Steel and Fireproof Construction. *Three hours.* Assistant Professor Newman.
Must be preceded by Architecture 19 and 20, or for students in Program III, Engineering Mechanics 1 and 2.
Lectures, problems, notes and assigned reading on building materials and methods of construction, with particular reference to steel and enclosing and protection materials against fire and other destructive elements. Design of columns, beams, plate girders, and trusses; specifications and estimates.

23. Structural Design: Steel. *Two hours.* Assistant Professor Newman.
Must be preceded or accompanied by Architecture 22.
Working drawings and details of a steel-frame building.

26. Masonry and Reinforced Concrete. *Two hours.* Professor McConkey.
Must be preceded by Architecture 19 and 20.
Lectures, problems, text and assigned reading on building materials and methods of construction, with particular reference to reinforced concrete. Brick, stone, terra cotta, cements and waterproofing are also considered; specifications and estimates.

27. Structural Design: Masonry. *Two hours.* First semester. Professor McConkey.
Must be accompanied by Architecture 26.
The design of foundations, columns, slabs, beams and girders of various types, as used in buildings.

35. Structural Design. Special problems in building construction. *Four hours.* Assistant Professor Newman.
Must be preceded by equivalent of Architecture 22, 23, 26, and 27, or C. E. 2, 2*a*, and 3.

Drawing and Painting

The aim of the instruction in free-hand drawing and in painting is to teach accurate observation of form, proportions, light and shade, and color, and their artistic representation and interpretation, both as

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a matter of general education and as part of a more specific training for teaching or in pictorial or decorative art, or in architecture.

For the general student Courses 21, 22, and 24, will give an elementary training in drawing and painting. Course 30 provides more advanced work in painting; Courses 25, 26, and 27, more advanced training in drawing. Course 23 is a special course in the drawing of ornament for students of architecture and decoration, while Course 35 is primarily for architectural students, although open to others. Outdoor sketching and painting can best be studied during the summer session.

At present there are no classes in portrait painting nor painting from the costume model, but such instruction can, under certain conditions, be arranged for groups of students who have adequate advanced preparation.

The drawing is done in pencil, crayon, charcoal, and pen and ink from various kinds of objects and models including ancient, medieval, Renaissance, and modern ornament and sculpture. Rapid sketching from the figure is carried on as part of Courses 27 and 28 to stimulate indication of essentials.

The painting is done mostly in water colors, although non-architectural students may paint in oil.

Still-life painting in water color or oil, cannot be studied profitably without some preliminary training in free-hand drawing (Drawing 21 and 22). For drawing from the living model some preliminary training is required from the antique (Drawing 25 and 26).

All the courses are given both semesters and instruction is given in Courses 21 to 26 inclusive every morning and afternoon. The hours for these and other courses are shown in the classification pamphlet of the Colleges of Engineering and Architecture published at the beginning of each semester.

In general six hours class work per week for a semester are required for a two-hour credit course. A given course must be elected with a single instructor and in periods of not less than two hours consecutively.

Advancement in all these courses is individual, depending on the progress made by the student and determined largely by work done without criticism. Advanced standing may be had as in other subjects on the basis of satisfactory work done elsewhere. Drawings should be brought to help determine the student's standing, also letters or certificates from the institution attended.

The following courses are open to others as well as architectural students. The courses are to be elected as Drawing 21, 22, etc., and in the order given.

21. Free-Hand Drawing. *Two hours.* Mr. MAKIELSKI, Mr. O'DELL, and Miss HELLER.
Drawing from simple forms in line and light and shade.

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22. Free-Hand Drawing. *Two hours.* Mr. MAKIELSKI, Mr. BARNES, Mr. O'DELL, and Miss HELLER.
Drawing from simple decorative forms, natural and architectural.

23. Free-Hand Drawing. *Two hours.* Mr. BARNES.
Drawing from decorative forms and portions of the figure.

24. Water Color Painting. *Two hours.* Mr. BARNES.
Painting from still life.

25 and 26. Free-Hand Drawing. *Two hours* each. Mr. MAKIELSKI.
Drawing from the full figure.

27 and 28. Free-Hand Drawing. *Two hours* each. Mr. MAKIELSKI.
Drawing from life.
Admission to these courses is limited to those who have satisfactorily completed the preceding courses or their equivalent.

30. Water Color Painting. *Two hours.* Mr. MAKIELSKI, and Mr. BARNES.
Painting in water color from still life. This course must be preceded by Drawing 24.

[33. Clay Modeling. *Two hours.*
Omitted in 1919-1920.]

35. Pen and Ink. *One* or *two hours.* Mr. BARNES.
For regular students of architecture this course must be preceded by Courses *4a*, 21, 22, and 23 in Drawing and Architecture 5. Students not registered in Architecture should have the equivalent of six credit hours in free-hand drawing before electing it.

SECOND SEMESTER

Architectural Design

In the following courses in Architectural Design problems are assigned to be worked out in the drafting-room. Lectures are given from time to time bearing on the type of building then being designed. Study of the requirements of various classes of buildings and of the artistic possibilities of building materials; training of the student in composition in plan, section, elevation, and perspective, in accurate draftsmanship and rendering in line, wash, and color.

Courses 4 to 10 inclusive constitute a progressive series of problems in architectural planning and design, advancing from the small building to the more important classes of buildings and to the group problem. The courses must be taken in the order given.

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1. Elements of Design. *Three hours.* Assistant Professor LOOMIS.

4. Architectural Design. *Three hours.* Assistant Professor BENNETT, and Mr. O'DELL.
The orders and problems in which they are employed. This course must be preceded by Drawing *4a*, Drawing 21, and Architecture 1.

5. Architectural Design. *Four hours.* Professor BOYNTON.
The small ensemble. Course 5 should be preceded by Drawing *5a*, and 22, and by Courses 4 and 21 in Architecture.

6. Architectural Design. *Four hours.* Assistant Professor LOOMIS.
This course is a continuation of Course 5, and must be preceded by it and by Architecture 22.

7. Architectural Design. *Six hours.* Professor ROUSSEAU. Plan problems.
This course must be preceded by Course 6.

8. Architectural Design. *Six hours.* Professor ROUSSEAU. Plan problems.
This course must be preceded by Course 7.

9. 10. Architectural Design. *Eight hours.* Professor ROUSSEAU. Advanced plan problems.
These courses must be preceded by Course 8.

12. Ancient and Medieval Architecture. *Three hours.* Second semester. Professor LORCH.
Should be preceded by Drawing 21 and accompanied by Architecture 4.
The architecture of Egypt, Assyria, Persia, Greece, and Rome and a survey of the subsequent architectural development to Gothic architecture.

17. The Allied Arts of Design. Lectures, research, and exercises in design. *Three hours.* Professor LORCH.
Ornament, mural painting, decorative sculpture, furniture, metal work, glass, ceramics, and textiles.

Building Construction and Equipment

19. Architectural Mechanics. Statics. Stresses in Simple Trusses. *Three hours.* Assistant Professor NEWMAN.

20. Architectural Mechanics. Advanced Problems in Statics. Strength of Materials. *Three hours.* Professor MCCONKEY.
Must be preceded by Architecture 19 and accompanied by laboratory tests.

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21. Wood Construction. Lectures, conferences, text-books, drawings, and visits to buildings. *Two hours.* Professor McCONKEY.
Building materials and processes; primarily wood construction; working drawings.

22. Steel and Fireproof Construction. *Three hours.* Professor McCONKEY.
Must be preceded by Architecture 19 and 20.
Lectures, problems, notes and assigned reading on building materials and methods of construction, with particular reference to steel and enclosing and protection materials against fire and other destructive elements. Design of columns, beams, plate girders, and trusses; specifications and estimates.

22*a*. Steel and Fireproof Construction. *Three hours.* Assistant Professor NEWMAN.
Same as Architecture 22 but especially arranged for students in Program III in Architecture.

23. Structural Design: Steel. *Two hours.*
Must be accompanied by Architecture 22.
Working drawings and details of a steel-frame building.

23*a*. Structural Design: Steel. *Two hours.* Assistant Professor NEWMAN.
Same as Architecture 23, but especially arranged for students in Program III in Architecture.

25. Building Details. *Two hours.* Professor BOYNTON.
Must be preceded by Architecture 6, 21, and 22.
The purpose of this course is to give some specific training in detailing portions of buildings. Scale and full-size details.

35. Structural Design. Special problems in building construction. *Hours to be arranged.* Assistant Professor NEWMAN.
Must be preceded by equivalent of Architecture 22, 23, 26 and 27, or C E. 2, 2*a*, and 3.

Free-Hand Drawing and Painting

These courses are required of architectural students, but may be elected by others.

21 and 22. Elementary Free-Hand Drawing. *Two hours.* Mr. MAKIELSKI, Mr. BARNES, Mr. O'DELL, and Miss HELLER.

23. Drawing of Decorative Form. *Two hours.* Mr. BARNES.

24. Painting in Water Color from Still Life. *Two hours.* Mr. BARNES.

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25 and 26. Drawing from the Antique. *Two hours.* Mr. MAKIELSKI.

27 and 28. Drawing from Life. *Two hours.* Mr. MAKIELSKI.

35. Pen and Ink. *One and two hours.* Mr. BARNES.

SUMMER SESSION OF 1921

4. Study of the Orders. *Three hours.* Professor ROUSSEAU.

5. Elementary Architectural Design. *Three hours.* Professor ROUSSEAU.

7. Intermediate Architectural Design. *Credit to be arranged.* Professor ROUSSEAU.

9. Advanced Architectural Design. *Credit to be arranged.* Professor ROUSSEAU.

A. Free-Hand Drawing in Charcoal, and Painting in Water-Color. *Two hours.* Mr. SLUSSER.

Arts Course for Supervisors, Art Instructors, Grade Teachers, School Principals. *Credit to be arranged.* Miss GRATTAN.

This course will include nature study, industrial art, object drawing, construction, poster designing, costume designing, interior decoration, and home planning and landscape gardening.

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Medical School

A special announcement giving further information in regard to this School is published annually. For copies of this Announcement, or for other information relating to the School, address Dr. Charles W. Edmunds, Assistant Dean of the Medical School, Ann Arbor, Michigan.

The Medical School, for which provision was made in the legislative act by which the University was organized in 1837, was opened for students in 1850. The college year was lengthened from six to nine months in 1877. The course was lengthened to three years in 1880, and to four years in 1890.

The academic year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922. The lectures continue until early in June. The examinations are then begun, and concluded in time for the Commencement exercises.

For the summer session of this School, see a subsequent chapter.

REQUIREMENTS FOR ADMISSION

The following will be admitted to the Medical School as candidates for the Degree of Doctor of Medicine:

I. Graduates of the College of Literature, Science, and the Arts of this University, or of collegiate departments of other universities, or of approved colleges and scientific schools, provided they present credentials showing that they have had two years of Latin, two years of either French or German (one of which must have been taken in college), and one year each of collegiate work in Biology (Zoölogy and Botany), Chemistry (including Organic Chemistry) and Physics (including laboratory). Applicants holding graduate degrees, namely, A.M., M.S., Ph.D., and D.Sc., are subject to the same regulations.

II. Students registered on the combined curriculum in Letters and Medicine, offered in this University, and who have followed this curriculum as outlined, may enroll in the Medical School after having obtained 67 hours (B.S. and M.D. degrees) in the College of Literature, Science, and the Arts, or 90 hours (A.B. and M.D. degrees), if they meet the other requirements. (See Combined Curriculum in Letters and Medicine).

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III. Matriculate candidates for the bachelor's degree (a) of the College of Literature, Science, and the Arts of this University, and (b) of the collegiate department of other universities, and of approved colleges and scientific schools, who can present evidence of being graduates of an approved high school, and in addition thereto can bring from the Dean of the College of Literature, Science, and the Arts of this University a statement showing that they have completed the equivalent of 60 hours of credit in that College will be admitted in case their credentials show that they have covered the subjects named under I.

In order to meet the requirements in Latin the applicant should have covered Latin grammar and at least four books of Caesar or their equivalent.

No student therefore will be admitted to the school who has not completed two years of college work, in addition to graduating from an approved High School, or its equivalent, and no entrance conditions will be allowed.

Standard of Scholarship Required for Admission to the Medical School

Students enrolled in the College of Literature, Science, and the Arts of this University who desire to enter the Medical School must present credentials showing not only a minimum of two years of college credit, 60 hours, (including the specific subjects required for admission to the school), but also furnish evidence of an average scholarship for the two years of at least a "C" grade. In addition they must not be on the "Warned" or "Probation" list during the final semester in that College.

Students coming from other institutions not employing a similar grading system will be required to furnish a recommendation from the proper authority in the school from which they come.

COMBINED CURRICULA IN LETTERS AND MEDICINE A.B. AND M.D.

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and the Doctor of Medicine in the Medical School, may, by enrolling in the Combined Curriculum in Letters and Medicine, shorten from eight years to seven the time required to earn the two degrees. This privilege is open only to students who throughout their course maintain a uniform record of good scholarship. The work is under the direction of a Committee of five members representing the College of Literature, Science, and the Arts, and the Medical School. With the consent of the Committee in charge, a candidate for the degree of Bachelor of Arts, who has been a student in the College of Literature, Science, and the

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Arts for at least one year and has 90 or more hours to his credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts, of this University, may enroll upon the combined curriculum; that is, while continuing his registration in the College he may also register in the Medical School, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete within one year the specified requirements described in the following paragraphs.

All students desiring to enter upon the Combined Curriculum must, before May 15 of the year preceding the double registration, file with the Registrar of the College of Literature, Science, and the Arts, on a blank to be obtained from him, a petition to be granted that privilege.

When the student so registered in the College and School has completed the first year of the Medical curriculum, and not less than 90 hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has completed the requirements for graduation from the latter college. (See page 138), and provided his work has included the following courses:

Rhetoric, 6 hours, including Courses 1 and 2.
French and German, 16 hours of either one, and 8 hours of the other.
English, 6 hours.
Psychology, 6 hours.
Electives from Group III, 12 hours, unless excused in part by the Committee.
Physics, 8 hours, including two hours of laboratory work, and exclusive of Physics Z. Plane Trigonometry and a unit of preparatory Physics are prerequisite for this work.
Chemistry, General, Qualitative, and Organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Zoölogy, 10 hours.
Botany, 4 hours.
Total, 90 hours.

Suggested electives: Latin or Elementary Greek, 8 hours; History, or Economics, or Philosophy, 8 hours; Qualitative Analysis, 4 hours; Organic Chemistry, 5 hours.

B.S. (IN MED.) AND M.D.

Students who so desire, may obtain the Degrees of Bachelor of Science in Medicine and Doctor of Medicine in six calendar years by complying with the requirements above set forth, except that they must complete the first and second years of the medical curriculum and that the credit required from the College of Literature, Science,

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and the Arts instead of 90 hours, shall be 67 hours before they may enroll upon the Combined Curriculum and 75 hours before they receive the B.S. (in Med.) degree, and shall include the following courses:

Rhetoric, 6 hours, including Courses 1 and 2.
French or German, 16 hours of one.
Electives from Group III, 12 hours.
Physics, 8 hours, including two hours of laboratory work. Plane Trigonometry and a unit of preparatory Physics are prerequisite for this work.
Chemistry, General, Qualitative, and Organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Zoölogy, 4 hours.
Botany, 4 hours.
Total, 75 hours.
Electives are suggested from the courses before mentioned.

Students taking the six-year course will ordinarily need to attend the College of Literature, Science, and the Arts two and one-half years, or two years and two summer sessions. Those whose scholarship is sufficiently high may apply for admission to elect a limited number of extra hours.

ADMISSION TO ADVANCED STANDING

The applicant must have studied as a matriculated medical student, in an approved medical school for a period of time at least equal to that already spent by the class which he seeks to enter. He must present credentials showing that he has satisfactorily completed courses equivalent in amount and character to those given in this school, in the year or years preceding that to which he seeks admission and must pass examinations at the beginning of the session in all the subjects that have already been pursued by the class which he desires to enter. Certificates of standing should be presented, but these cannot be accepted in place of these examinations.

COURSES OF INSTRUCTION

The regular curriculum covers four years of nine months each. The first two years are devoted to the more fundamental scientific courses which serve as a basis for the technical and clinical studies which follow. Nearly the entire time of the first year is devoted to laboratory work. The forenoons of the remaining three years are devoted mainly to lectures and recitations, two or three each day; the

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afternoons to laboratory work, to clinical demonstration courses, and to clinics.

The following brief description show the character and extent of the instruction given in the several branches during the current year, and indicate the order in which the different portions of the course are studied. Further details are given in the Special Announcement of the School.

ANATOMY

1. Systematic Course in Gross Human Anatomy. The course is repeated in periods of about twelve weeks each. October to December, January to April. Daily, afternoons, 1:00 to 5:00.

1*a*. Systematic Course in the Anatomy of the upper part of the body, including the head, neck, thorax, and upper extremities. *Six hours.*

1*b*. Systematic Course in the Anatomy of the lower part of the body, including the abdomen, pelvis, and lower extremities. *Six hours.* Recitations for each section three hours weekly. Professor McCOTTER, and Assistants.

2. Embryology, Histogenesis, General Histology, Organology, and Anatomy of the Special Sense Organs and Nervous System. Lectures, recitations, and laboratory work. Daily, 8 to 12, Saturday included, October to end of February. Professor HUBER, Assistant Professor SNYDER, and Assistants.

2*a*. General Embryology, General Histology, and Histogenesis, and the Structure of the Elementary Tissues. *Six weeks.*

2*b*. Organology, including the development of the organs. About six weeks.

2*c*. Gross and Microscopic Anatomy of the Central Nervous System and Special Sense Organs. *Six weeks.*

3. Lectures, Recitations, and Laboratory Work in Human Anatomy for Dental Students. Fourteen weeks, March to June. Daily, 1 to 5. Saturday included. *Eight hours.* Professor McCOTTER, and Assistants.

5. Lectures, Recitations, and Laboratory Work in Embryology and Histology for Dental Students. Twelve weeks, March to June. Two sections, each working three half days a week, 1 to 5. Saturday, 8 to 12. Professor HUBER. Assistant Professor SNYDER, and Assistants.

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5. Regional and Topographic Anatomy, based on frozen sections, with Lectures and Demonstrations correlating developmental microscopic and gross Anatomy. Eight weeks, April to June, 8 to 11 daily. Professors HUBER and MCCOTTER, Dr. GUILD, and Assistants.

6. Surgical and Applied Anatomy. Second semester. *One hour.* Professor CABOT.

7. Anatomy of Special Regions. Open to Graduates in Medicine and Undergraduates who have completed Course I. Hours to be arranged with the Instructor in charge. Professor MCCOTTER.

8. Histology and Embryological Technique. Professor HUBER, and Assistants.

9. Advance Course in Mammalian Embryology, Histogenesis, and Histology. Professor HUBER.

10. Comparative Vertebrate Neurology. Professor MCCOTTER.

11. Advance Course in the Development and Microscopic Anatomy of the Central and Peripheral Nervous System, Human and Comparative. Professor HUBER.

12. Research in Vertebrate Histology, Embryology, Anatomy of the Nervous System, Gross Anatomy, Human and Comparative. Professors HUBER and MCCOTTER.

SUMMER SESSION OF 1921

1. Laboratory Work in Human Anatomy. Professor MCCOTTER, and Dr. GUILD.

2. Regional and Topographic Anatomy. Professor MCCOTTER, and Dr. GUILD.

3. Embryology and Histology. Professor HUBER, and Drs. SNYDER and THOMPSON.

Bacteriology

(See under Hygiene.)

DERMATOLOGY AND SYPHILOLOGY

1. Clinical lectures and conferences, one and one-half hours a week. Fourth year. Professor WILE.

2. Histopathology of the more common cutaneous disorders. Sixteen hours in the second semester. Dr. MARSHALL.

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3. Recitations, clinic, and lantern slide demonstration, one hour a week, second semester. Third year. Professor WILE.

4. Dermatology and Syphilology. Section work. Professor WILE, and Assistants.

HYGIENE, BACTERIOLOGY, AND PHYSIOLOGICAL CHEMISTRY

1. General Hygiene. Lectures. Three times a week, second semester, second year. Professor VAUGHAN.
This course is open to non-medical students.

1*a*. General Hygiene. Lectures. Four times a week, second semester. Professor VAUGHAN.

2. General Bacteriology. Lectures and quizzes. Daily, second semester, first year. Professor NOVY.

3. Practical Bacteriology. Laboratory work and recitations. Afternoons for twelve weeks, beginning early in March, first year. Professor NOVY, and Assistant Professor HADLEY.
This course is open only to students of this School.

3*a*. Practical Bacteriology. The same as Course 3, but open to students other than those eligible to Course 3. December to March. Professor NOVY, and Assistant Professor HADLEY.

3*d*. Practical Bacteriology. For Dental students only. Eight weeks. 1 to 6, beginning the first week in October. Assistant Professor HADLEY.

3*e*. Practical Bacteriology. *M, W, F,* 1-6, during the second half of the first semester. Open only to students of Sanitary Engineering. Assistant Professor HADLEY.

3*l*. Practical Bacteriology. This begins about December 1st and continues until the end of the semester. It is open to non-medical students and covers the same ground as 3*d*. Daily, 1 to 6 P. M. *Three hours.* Professor NOVY, and Assistant Professor HADLEY.
This course is intended for literary and pharmacy students.

4. Advanced Bacteriology. Professor NOVY, and Assistant Professor HADLEY.
Course 4 must be preceded by Course 3, or 3*a*. It is an optional course, and is open only to a limited number of students.

4*a*. Serum Reactions and The Pathogenic Protozoa. Continuation of Course 4. Professor NOVY, and Assistant Professor HADLEY.

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5. Water Analysis. Chemical, microscopical, and bacteriological study of drinking water. Professor VAUGHAN, and Miss CALDWELL.

5*E*. Water Analysis. Two afternoons weekly during the first half of the semester. Open only to students of Sanitary Engineering. Professor VAUGHAN, and Miss CALDWELL.

6. Food Analysis. Chemical and bacteriological examinations of food. Professor VAUGHAN, and Mr. COLLINS.
Course 6 is open only to students specially qualified for the work.

7. Research Work on Hygiene Problems. Professors VAUGHAN and NOVY.
Course 7 is open only to students specially qualified for the work.

8. Physiological Chemistry. Lectures. Three times a week, first semester, second year. Professor VAUGHAN.

9. Physiological Chemistry. Laboratory work and recitations. Afternoons for nine weeks, second year. Professor NOVY, and Mr. MCKINLEY.

10. Advanced Physiological Chemistry. Afternoons for nine weeks. Professor NOVY, and Mr. MCKINLEY.
Course 10 is an optional course.

11. Research in Bacteriology and Protozoölogy. Professor NOVY.

12. The Administration of Health Laws. Professor VAUGHAN.

SUMMER SESSION OF 1921

3*s*. Laboratory Work in Bacteriology. Mr. A. P. OHLMACHER, and Assistant.

4*s*. Vaccines and Sero Reactions. Assistant Professor DEKRUIF.

9*s*. Laboratory Work in Physiological Chemistry. Mr. M. W. GERMAN.

INTERNAL MEDICINE

1. Physical Diagnosis. Introductory Course. Four hours a week, second semester, second year. Assistant Professor WICKETT, Dr. SQUIER, and Dr. CORLEY.

2. Laboratory Diagnosis. Four hours a week, second semester, second year. Assistant Professor CONNELL, and Dr. CORLEY.

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3. Clinical Medicine. Introductory Course. Daily except Saturdays, 1 to 5 for eight weeks, third year. Assistant Professor WICKETT, Dr. SQUIER, and Dr. CORLEY.

4. Clinical Lectures. Three hours a week throughout the third year. Professors NEWBURGH and WILSON, and Assistant Professor CONNELL.

5. Bedside Instruction. Daily, 8 to 12, for eight weeks, fourth year. Professors NEWBURGH and WILSON, and Assistant Professor CONNELL.

6. Clinical Pathological Conference. Two hours a week throughout the fourth year. Professors WARTHIN, CABOT, and NEWBURGH.

7. Diagnostic Clinic. Two hours a week throughout the fourth year. Professors NEWBURGH and CABOT.

SUMMER SESSION OF 1921

1. Physical Diagnosis. Assistant Professor WICKETT.

2. Laboratory Diagnosis. Assistant Professor CONNELL.

MEDICAL JURISPRUDENCE AND TOXICOLOGY

1. Lectures from the legal standpoint. First semester, fourth year. Mr. LIGHTNER.

2. Lectures from the medical standpoint. Second semester, fourth year. Assistant Professor EMERSON.

NEUROLOGY

1. Lecture and Recitation Course. Three hours each week throughout the second semester, third year. Professor CAMP.

2. Clinical Lecture. Two hours each week throughout the fourth year. Professor CAMP.

3. Ward Class. Two hours daily, fourth year. Professor CAMP.

OBSTETRICS AND GYNECOLOGY

1. Theory of Obstetrics. Lectures, recitations, clinical conferences. Three times a week, first and second semesters, third year. Professor PETERSON, Dr. HOAG, Dr. CRON, and Dr. MILLER.

2. Demonstration Course in Obstetrics. Three times a week for eight weeks, third year. Dr. CRON and Dr. MILLER.

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3. Gynecology. Lectures, recitations and demonstration of cases. one hour a week, third year. Professor PETERSON.

4. Obstetric and Gynecologic Clinic. One hour and a half a week, fourth year. Professor PETERSON.

5. Practical Obstetrics. Small sections, Fourth year. Dr. CRON and Dr. MILLER.

6. Obstetrics and Gynecology. Diagnostic Clinic and Ward Class. Three hours a day for eight weeks. Professor PETERSON, Assistant Professor SHERRICK, and Assistants.

SUMMER SESSION OF 1921

Practical Course in Obstetrics and Gynecology. *Credit will be given for this course.* Dr. CRON.
Demonstration Course. *Credit will be given for this course.* Dr. MILLER.

OPHTHALMOLOGY

1. Lectures and Recitations. Fourth year. Professor PARKER.

2*a*. Clinical Lectures. Fourth year. Professor PARKER.

3. Demonstration Course. Twice a week, for eight weeks, third year. Assistant Professor SLOCUM.

OTO-LARYNGOLOGY

1. Lectures and Recitations. Fourth year. Professor CANFIELD.

2. Clinical Course. Fourth year. Professor CANFIELD, and Assistant Professor FURSTENBERG.

3. Demonstration Course. Twice a week, for eight weeks, third year. Dr. TOLAN.

PATHOLOGY

1. General Pathology. Four times a week, first semester; three times a week, second semester, second year. Professor WARTHIN.

2. General Pathology. Laboratory work. Afternoons for nine weeks, second year. Assistant Professors WELLER and TAYLOR.

3. Special and Gross Pathology. Gross pathological anatomy. One hour a week, third year, in addition to time taken for clinical autopsies. Professor WARTHIN.

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4. Autopsies. Professor WARTHIN, and Assistant Professor WELLER.

5. Pathological Technique. Elective. Professor WARTHIN, and Assistant Professor WELLER.

6. Pathological Physiology. Professor WARTHIN, and Assistant Professor WELLER.

7. Special Graduate Course. Research. Professor WARTHIN.

8. General Pathology for Dental Students. Professor WARTHIN.

9. Laboratory Course in General Pathology for Dental Students. Assistant Professors WELLER and TAYLOR.

10. Pathology of the Female Genito-Urinary Organs. Elective and Graduate Course. Professor WARTHIN, and Assistant Professor WELLER.

11. Special Pathology of the Infectious Diseases. Elective and Graduate Course. Professor WARTHIN, and Assistant Professor WELLER.

12. Special Pathology of Neoplasms. Elective and Graduate Course. Professor WARTHIN, and Assistant Professor WELLER.

SUMMER SESSION OF 1921

2. Laboratory Course in Pathology. Professor WARTHIN, and Assistant Professor WELLER.

5. Course in Pathological Technique. *Four hours graduate credit.* Assistant Professor WELLER.

10. Pathology of the Female Genito-Urinary Organs. *Four hours graduate credit.* Assistant Professor WELLER.

11. Special Pathology of the Infectious Diseases. Professor WARTHIN, and Assistant Professor WELLER.

12. Special Pathology of Neoplasms. Professor WARTHIN, and Assistant Professor WELLER.

PEDIATRICS AND INFECTIOUS DISEASES

1. Lectures, demonstrations, bedside instruction, and recitations on the Specific Infectious Diseases. Once a week, third year. Professor COWIE, and Instructor.

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2. Lectures, demonstrations, presentation of illustrative cases, and recitations on Infantile Nutrition and Infant Feeding. Twice a week during the second semester until the course is completed. Third year. Professor COWIE, and Dr. GREENTHAL.

3. Lectures, demonstrations, presentation of illustrative cases, and recitations on the common medical diseases of infancy and childhood. Comparison of adult and juvenile types of medical diseases. Two hours a week, second semester. This course follows Course 2 at the same hours.

4. General Clinic in Pediatrics. Once a week, fourth year. Professor COWIE.

5. Ward Work. Practical Work in Pediatrics and Infectious Diseases. Professor COWIE, Dr. GREENTHAL, and Dr. HOAG.

6. Post Graduate. Advanced clinical work is given in clinical chemistry, metabolism, infection, and immunity, particularly as related to the medical diseases of infancy and childhood and infectious diseases from the viewpoint of research.

PHARMACOLOGY AND THERAPEUTICS

1. Pharmacology. Lectures and recitations. Three times a week, second semester, second year. Professor EDMUNDS.

2. Pharmacology. Lectures and recitations. Four times a week, first semester, third year. Professor EDMUNDS.

3. Experimental Pharmacology. Second semester, second year. Professor EDMUNDS, Assistant Professor NELSON, and Assistants.

4. Research Work in Pharmacology. Third and fourth years. Professor EDMUNDS.

5. Practical Anaesthesia. Miss DAVIS.

SUMMER SESSION OF 1921

Experimental Pharmacology. Assistant Professor NELSON.

Physiological Chemistry

(See under Hygiene.)

PHYSIOLOGY

1. Physiology. Lectures, demonstrations, recitations. Five times a week, second semester, first year. Professor LOMBARD.

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2. Physiology. Continuation of Course 1. Lectures, demonstrations, recitations. Five times a week, first semester, second year. Professor LOMBARD.

3. Practical Physiology. Laboratory work. Afternoons for nine weeks, second year. Professor LOMBARD, and Assistant Professor COPE.

4. Advanced Work in Physiology. Professor LOMBARD.
Course 4 is open only to students who have completed Courses 1, 2, and 3, or an equivalent amount of work.

5. Research Work. Professor LOMBARD.

SUMMER SESSION OF 1921

1. Laboratory Work in Physiology. Assistant Professor COPE.

PSYCHIATRY

1. For third-year students. Fifteen exercises, each of two hours. Laboratory work in the pathological anatomy and physiology of the nervous system. Professor BARRETT, and Assistant Professor GURD.

2. Psychiatry. A clinical lecture course given one and one-half hours each week throughout the fourth year. Professor BARRETT.

3. Ward Class in Psychiatry. Professor BARRETT, and Dr. JACOBY.

4. Laboratory Work in Neural Pathology. Professor BARRETT, and Assistant Professor GURD.

5. Laboratory Work in Experimental Psychology. Professors BARRETT and PILLSBURY.

ROENTGENOLOGY

1. Radiology and Radiotherapy. Lectures and demonstrations once a week during both semesters, to the fourth year students. Professor VAN ZWALUWENBERG.

SURGERY

1. Lectures and Recitations. Twice a week, third year.

2. Minor Surgery. Once a week, second semester, third year.

3. Demonstration Course in Operative Surgery. Third year.

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4. Demonstration Course in General, Genito-Urinary and Orthopedic Surgery. Fourth year.

5*a*. General Surgical Clinic. Fourth year.

5*b*. Genito-Urinary Clinic. Fourth year.

5*c*. Orthopedic Surgery Clinic. Fourth year.

6. Diagnostic Surgical Clinic. Fourth year.

SUMMER SESSION OF 1921

1. Bandaging and Fracture Dressing. Assistant Professor PEET.

2. Operations Upon a Cadaver. Assistant Professor PEET.

3. Operations on Animals. Assistant Professor PEET.

BEDSIDE AND DISPENSARY INSTRUCTION

Senior students are given charge of patients, and are required to make diagnosis, prescribe, dress wounds, and perform minor operations under the direction of the professor in charge. A lying-in ward furnishes obstetrical cases, which are attended by the senior students in rotation.

COURSES IN PUBLIC HEALTH

Courses in Public Health are given in the Graduate School, leading to the degrees of Master of Science in Public Health and Doctor of Public Health.

The greatest movement of the present time is that of the prevention of disease and the conservation of human life and health. This has resulted in a great campaign of education of laymen in matters of hygiene and sanitation, and as a natural development out of this educational movement there has come an ever-growing demand for the services of men property trained as public health officers. The next decade will see a tremendous development of public health organization in the United States; and to meet this there must be made available a body of men educated in public health work. In this education of public health officers the State University finds an especially appropriate field, as no other matter more closely touches the lives and happiness of the citizens of the State. It is with this view-point that the University of Michigan offers these courses.

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RULES CONCERNING EXAMINATIONS

1. *Honor System.*—For a number of years all the examinations in this School have been under student control. Under this "Honor System" the faculty turns over to the students the complete supervision of all examinations. Each class elects an Honor Committee which has charge of this matter and which is responsible to the faculty. In case there is any infraction of rules, this committee tries the offender, and if necessary makes recommendations to the faculty for official action.

2. Examinations (either written or oral, or both) will be held at the close of each course or semester. The result of each examination must be reported in writing and within ten days to the secretary of the Faculty by the professor in charge.

3. A student may be marked A, excellent; B, good; C, fair; D, conditioned; or E, not passed. A student may also be reported Incomplete, in which case he may apply for examination or re-examination in the same subject at the close of the next course or semester or at a time set by the professor in charge, provided he has completed the work of the course. A student reported D (conditioned) can apply for re-examination in the same subject at the close of the next course or semester, or at the next officially announced time for the removal of conditions. Examinations for the removal of conditions are held during the first week of the session and immediately after spring vacation. A student reported as Absent may at the discretion of the professor in charge be given a special examination or comply with the rule governing the removal of conditions. A student reported E, "not passed," cannot apply for re-examination until he has again taken the course in which he has failed.

4. All "Incompletes" and "Conditions" not passed within one year become "Not Passed."

5. Candidates for graduation failing in an examination will be allowed a re-examination before the entire Faculty, and failing in this, such students may again present themselves for examination at the expiration of a time which shall be determined by the Faculty, but which shall not be less than three months, nor longer than twelve months.

6. No student shall be recommended for graduation until all his required work is completed and all his examinations passed.

7. *Delinquent Students.*—The Faculty has appointed a Committee on Delinquent Students whose duty it is to take under consideration the cases of all students whose work has not been maintained at the proper standard. After necessary investigation has been made as to the cause of failure, this committee makes recommendations to the Faculty for official action.

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INSTRUCTION FOR WOMEN

The course of instruction for women is in all respects the same as for men. It has been found in this and other of the better medical schools that both sexes may attend with propriety and at the same time the various laboratory courses, including Practical Anatomy, the lecture courses, as also the sectional and public clinics.

REQUIREMENTS FOR GRADUATION

To be admitted to the degree of Doctor of Medicine, a student must be twenty-one years of age, and possess a good moral character. He must have completed the required courses in laboratory work and have passed satisfactory examinations on all the required studies included in the full course of instruction. He must have pursued the study of medicine for a period of four years and have attended four full courses of medical lectures, the last of which must have been in this School.

Graduates of other reputable medical schools, wishing to take a degree in this School, must regularly matriculate and do all the work required in this School and not required in the school that has granted the diploma already held. The shortest term of residence for such graduates is one year. Graduates of other reputable medical schools may, however, without becoming candidates for a degree, pursue any of the graduate courses on the conditions stated below.

GRADUATE COURSES

(See the chapter on the Graduate School.)

The rapid development of medical science has necessitated the introduction of many new subjects into the curriculum, and this leads practitioners, who wish to keep abreast of the times, to return to the University in order to take special courses in the newer subjects. Moreover, at the present time some of the laboratory and demonstration courses mentioned in the preceding schedules are not given in many American medical colleges, and there have been frequent requests for admission to these courses from graduates of such schools. The frequency of these requests has led the Board of Regents to authorize the Faculty to admit medical graduates to any one or more of the regular courses when such candidates give evidence of their ability to profit by such instruction. In such cases the graduate student must pay ten dollars tuition for each course taken in addition to the ordinary laboratory expenses of such course.

Graduate work is also offered to students who have taken the full required courses.

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MUSEUMS AND LABORATORIES

For further information in regard to the University museums, laboratories, libraries, and gymnasiums, see page 59.

ANATOMICAL COLLECTION

The museums of the late Professors FORD and SAGER, including several thousand specimens, the result of many years' labor in collecting and preparing material intended to aid directly in teaching, are now the property of the University. Other preparations are constantly being added, and the museum now contains a valuable collection of bones, illustrating abnormal as well as normal conditions and the various changes that occur from infancy to old age; dissections, general and partial, of the vascular, nervous, and muscular systems; series of sections made of frozen bodies; preparations illustrative of visceral and other anomalies; models of various organs and portions of the body in wax, papier-maché, and plaster, and preparations and models illustrating the phenomena of human and comparative embryology and neurology.

The collection contained in the University Museum and the valuable osteological and odontological collections in the museum of the College of Dental Surgery are also open to the inspection of students.

MUSEUM OF PATHOLOGY

The laboratory of pathology contains a very complete and well-arranged pathological museum with many rare and valuable specimens, utilized for teaching purposes.

MUSEUM OF MATERIA MEDICA

The museum of materia medica consists of a fairly complete collection of the crude substances used in medicine, along with their principal preparations and active principles. In the arrangement of the drugs into groups convenient for study, importance is attached not to their origin but to their action. The museum is also provided with several works of reference for use of students, and with a number of graphic registrations of the action of drugs. It is open to students of the junior class at such hours as they arrange with the instructor.

MUSEUM OF NATURAL HISTORY AND LIBRARY

Students in medicine have access to the botanical, zoölogical, and geological cabinets of the University, estimated to contain 255,000 specimens. The Medical Library contains 35,000 volumes and 500

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pamphlets, and is housed in the General Library. A complete catalogue, arranged both by authors and by subjects, is accessible to readers. The leading medical periodicals of this country and of Europe, 400 in number, are taken and kept on file. For information concerning the General Library and the special libraries in chemistry and biology, see page 59.

ANATOMICAL LABORATORIES

The laboratory of anatomy is situated on the third floor of the Medical building and contains six well lighted and well ventilated dissecting rooms. A study room is provided for the convenience of the students, as also rooms for research and for special dissections, both comparative and human.

The laboratory possesses an osteological loan collection, and students are permitted to withdraw sets of bones illustrative of human osteology, which they may retain during their stay in the anatomical laboratory.

The histological laboratory is on the second floor of the Medical building. It provides facilities for elementary and for advanced work in histology and histogenesis. There is a large general laboratory for the elementary work in histology, and smaller rooms for the elementary and advanced work in histology and vertebrate embryology, together with storage rooms, a room in which a reference library is shelved, and private rooms for the use of the professor in charge and his staff. Suitable provision is made for students and graduates who desire to engage in the work of research. The laboratory equipment includes the apparatus and instruments needed for conducting the elementary work in histology and embryology, and for special research. An excellent collection of the Ziegler embryological models and of models of various glands and other minute anatomic structures made after the Born method of wax plate reconstruction and of corrosion preparations facilitates the work of instruction in the courses of histology and embryology. Every encouragement is given students and other persons of sufficient preliminary training to undertake the investigation of special problems.

PHYSIOLOGICAL LABORATORY

The apartments provided for the physiological laboratory offer excellent facilities for practical work, whether of class instruction or of original investigation. Large and well-lighted rooms are appropriated to the use of the undergraduate students, who perform under the direction of instructors most of the fundamental physiological experiments. The subjects commonly embraced in the practical course relate to the physiology of muscle and nerve, reflex action, circulation, respiration, and digestion. Smaller rooms are devoted to ad-

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vanced work and original investigation. The laboratory has a good supply of apparatus, tools, etc., and is open daily for physiological experiment and research.

PHARMACOLOGICAL LABORATORY

The pharmacological laboratory is well supplied with apparatus and material for original work in this branch of research, and any student or graduate receives every encouragement in the prosecution of such work.

PATHOLOGICAL LABORATORY

The first floor on the east side of the Medical building and rooms in the basement are occupied by the pathological laboratory. Increased facilities are now afforded for graduate work and for work in research. A special room is also assigned to work in gynecological pathology.

The laboratory is supplied with microscopes, microtomes, paraffin ovens, and other apparatus necessary in the study of pathologic histology. Each student is furnished with a locked containing a microscope with high and low powers and is assigned to a table containing the necessary stains and reagents for practical work. These are furnished by the laboratory.

The supply of material for the study of pathologic histology is the result of collections made in the pathological institutes of Vienna and Dresden, and embraces almost every known pathologic condition. This collection gives ample material for the regular courses, and, in addition, offers special opportunities to the advanced student who may wish to pursue studies in certain lines of special pathology, as the pathology of the nervous system, genito-urinary tract, skin, etc. In addition, an abundant supply of fresh material comes from the clinics of the University Hospital, and this is utilized to the fullest extent in the teaching both of gross and of microscopic pathology. The laboratory is fitted with a Bausch and Lomb carbonic acid freezing microtome for use in the making of quick diagnosis and in the preparation of fresh material for class study.

HYGIENIC LABORATORY

The hygienic laboratory, established by a special appropriation of the legislature in 1887, and opened for work January, 1889, is located in commodious quarters in the medical building. The facilities for original research have been enlarged, and from twenty to thirty students in research can be accommodated at once. Special rooms have been fitted up for the chemical, microscopical, and bacteriological study of foods and drinks, and for the prosecution of

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investigations in the chemistry and action of bacterial and other toxins. With the large incubating tanks now in use, it is possible to obtain a cellular substance of bacteria in large amounts.

PASTEUR INSTITUTE

The Pasteur Institute was established as a department of the hygienic laboratory in April, 1903. During the years 1903 to 1920 inclusive, 1,594 cases of hydrophobia were ereated at this institute. Residents of Michigan are treated at a charge of $25.00 and they must provide their own room and board. Persons from other states are charged one hundred dollars for the course of treatment. The institute gives opportunity for all medical students to become practically familiar with the procedure necessary in the treatment of rabies.

BACTERIOLOGICAL LABORATORY

The west half of the second floor of the Medical building, containing about 7,000 square feet of floor space, is devoted to work in bacteriology. The two main laboratories contain seventy-eight desks, used by beginners and by advanced students. All the material required for the work is supplied, practically at cost, from a well-stocked dispensing room. Four rooms are devoted to the research work of the professor in charge, his assistants, and others qualified to carry on special studies. An incubating room, maintained at a constant temperature, is provided with individual drawers for the use of students. A similar room is reserved for the work in research. A cold room, including a spacious refrigerator, is cooled by means of a liquid carbonic acid plant in such a way that the refrigeration can be kept at, or below, the freezing point, while the temperature of the room itself is maintained at about 60° F. A special compartment of 1,000 cubic feet capacity is reserved for experimental disinfection. Provision is made for operative work on animals, cremation of infected material, sterilization of cages, etc. The well-lighted ground floor contains the store rooms and animal rooms and, in addition, a large room for microphotography. Gas, water, steam, and compressed air are supplied to the hoods in every work room. The laboratory is equipped with apparatus and instruments of the best make.

LABORATORY OF PHYSIOLOGICAL CHEMISTRY

This laboratory is in the west half of the third floor of the Medical building, and occupies about the same floor space as the bacteriological laboratory above described. The two rooms for the elementary and the advanced work are provided with sixty desks. An adjoining room is occupied with balances and microscopes. A

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preparation room contains, among other things, a distilling plant from which the water is taken in pipes to different parts of the building. Special rooms are provided for the instructor and for research. There are also well-equipped rooms for combustions, for optical work, and for gas analysis. In every room there are spacious hoods with fittings for steam and compressed air in addition to gas and water. By an elaborate system of fan ventilation, the air in the laboratory is renewed every fifteen minutes. A small lecture room is in direct connection with the laboratory.

THE UNIVERSITY HOSPITAL

The University Hospital has the great advantage of being a hospital instituted primarily for teaching purposes, as all who are admitted are utilized freely for instruction. There are few hospitals where this is carried so far, the only restriction being the possibility of doing the patient harm. It may be well to emphasize this fact, as it has formed a distinct feature of this hospital since its beginning in 1869, when a large dwelling house, situated on the campus, was converted into a hospital, giving accommodation to about twenty patients, and in its further growth this feature has been maintained and developed. The hospital now embraces a central building erected in 1891, one office building, completed in 1896, a western building or pavilion acquired in 1901, a large addition known as the "Palmer Ward," and a central heating plant, containing the laundries, completed in 1903, a psychopathic hospital, and a contagious disease hospital built to accommodate twenty-four patients, an eye and ear ward, to accommodate forty patients, and a maternity hospital. The hospital now has 460 beds and contains two clinic ampitheatres, clinical laboratories, and a room for X-ray diagnostic work and X-ray therapy. An interne's home, erected in 1912, forms another of this group of buildings. The whole hospital is under the supervision of the Faculty and under the immediate direction of the hospital committee. The clinical teachers attend regularly upon the patients (each upon such cases as come regularly within his special department), and give the clinical instruction. Clinics are held every day during the college year and during the summer session for medical, surgical, gynecological, ophthalmological, and venereal cases, at which time examinations are made, prescriptions given, and surgical operations performed in the presence of the classes or of sections thereof.

The patients are assigned to students who take the histories of the cases, make the physical examinations, the diagnosis and prognosis, and suggest the line of treatment or operative procedure thought necessary, this under the direction of the professor in charge. The clinical laboratories under the direction of the departments of internal

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medicine, surgery, gynecology, and nervous diseases, all of which are especially equipped, furnish facilities for the scientific study of cases and are freely used by students as time and space permit. Stress is laid upon the value of ward and bedside instruction. The character of the hospital is such that this mode of instruction can be carried out more fully and more systematically than in many hospitals available for teaching purposes; this justifies the statement that the practical hospital work the students of this school are able to do is not yet given in many medical schools. Without detracting in any manner from the benefit which the patient may receive, it may be stated that much of the work of giving treatment, of dressing wounds, and of giving other detailed attention to patients is carried out, under proper supervision, by senior students. For the treatment of diseases of the nervous system, the hospital is furnished with apparatus for generating all kinds of electrical currents. In the lying-in ward the senior students are given an opportunity to attend cases of labor and become familiar with the duties of the lying-in room, under the immediate direction of the professor of obstetrics and his assistants. A large number of the cases submitted to the hospital are from a distance, and are of more than common interest, including numerous surgical and gynecological cases requiring major operations, many cases of disease of the lungs, heart, blood, digestive system, kidneys, and the nervous system. The eye, ear, nose, and throat service is large and replete with instructive cases. Patients with contagious diseases are treated in the isolation hospital. The expenses to patients are only for their board, for unusual appliances or for special nursing, and for medicines, the services of the clinical teachers of the Faculty being rendered gratuitously.

Patients who desire to enter the hospital are requested to write to the Superintendent of the University Hospital, Ann Arbor, Michigan, to ascertain if there is room for their accommodation and to obtain a circular giving more fully the rules governing admission.

Psychopathic Hospital

The legislature of the State of Michigan, with a wise conception of the needs of those afflicted with mental disorders, and with a high appreciation of the advances of modern medical research, made provision for an addition to the University Hospital of a ward especially equipped for the care of a limited number of acute cases of insanity. This was done with the view of furnishing an opportunity for the more thorough study of the conditions attending insanity in its incipient stages, and with the hope that, by the aid of specialists in all branches of medicine and surgery, and the laboratory facilities available at the University Hospital, there might result the discovery of causes of these diseases at present time unknown, and the development of methods of treatment that might increase the number of

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cures. The advantages to the medical student of such an addition to our hospital are apparent to all.

TRAINING SCHOOL FOR NURSES

The University Training School for Nurses was established in 1891, and has grown with the expansion of the Hospital until it now numbers 190 nurses in training. The Superintendent of Nurses, her three assistants, five clinic nurses, and twelve ward supervisors, constitute the administrative staff. Students are admitted to the school upon the same terms as to the College of Literature, Science, and the Arts of the University (see page 120), and diplomas are granted by the Board of Regents at the completion of three years of forty-eight weeks each, only after efficiency has been proved by class and ward work and by examination. For further information in regard to the school application should be made to the Superintendent of Nurses and Principal of the School, University Hospital, Ann Arbor, Michigan.

Combined Curriculum in Letters and Nursing

A combined curriculum five years in length has been established, leading to the degree of Bachelor of Science (in the College of Literature, Science, and the Arts), and the Diploma in Nursing (in the Training School for Nurses.) It is described in detail on page 152.

Public Health Nursing

A program in Public Health Nursing has been introduced, including both theoretical and field work. Graduate Registered Nurses and senior pupil nurses of approved schools will be admitted, provided their preliminary education has been adequate to enable them to pursue the course with profit. Further information may be obtained by addressing Mrs. BARBARA H. BARTLETT, B.S., Director of Training in Public Health Nursing.

MEDICAL BUILDINGS

The Medical building, completed in 1903, measures 175 by 145 feet, with an interior court, measuring 75 by 45 feet, and has a high basement and three stories. It provides accommodation for the departments of hygiene, bacteriology, physiological chemistry, pathology, anatomy, histology, and embryology. It contains, further, two large amphitheatres, two lecture rooms, a faculty room, and the offices of the Dean and the Secretary.

The department of physiology and pharmacology have been pro-

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vided for in the north wing of the building vacated by the department of chemistry. This building has been entirely rebuilt and refurnished, and in addition to the large laboratories, for general student use, there are also smaller rooms for the accommodation of assistant and research students.

BEQUESTS

The Elizabeth H. Bates Bequest

In the spring of 1898, Dr. Elizabeth H. Bates, of Port Chester, N. Y., died leaving to the Medical School an estate valued at about $140,000. Dr. Bates was in active practice for many years. She took a deep interest in the medical education of women, and the bequest may be looked upon as a recognition by her of the successful efforts made by the University of Michigan to give to women medical instruction equal to that furnished to men. In accordance with a provision of the will the title of Bates Professor of Diseases of Women and Children has been given to Dr. Reuben Peterson. (The didactic and clinical work in connection with children's diseases is in charge of the chair of Pediatrics and Infectious Diseases.)

The Treadwell Bequest

The late Mrs. Edward Treadwell, of Ann Arbor, bequeathed to the University Hospital the sum of $2,000.

The Davis Bequest

The late Mrs. Davis, of New Castle, Ind., made the University Hospital and the Ann Arbor Society for the Prevention of Cruelty to Animals her residuary legatees. The value of this bequest is about $2,000.

The Palmer Bequest

Mrs. Palmer, widow of Professor Alonzo B. Palmer, formerly Dean of this School, left the sum of thirty-five thousand dollars to the Hospital, and the "Palmer Ward" has been erected and equipped as a memorial to this distinguished pioneer in American medicine.

In addition to the above sum, Mrs. Palmer left $15,000, the income from which is used to support free beds in the University Hospital.

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The Mary J. Furnum Bequest

By the will of the late Mary J. Furnum, of Ann Arbor, there was bequeathed to the Palmer Hospital Fund the sum of $1,000, the interest from which, by resolution of the Board of Regents, is to be used for the purpose of apparatus for the study of Children's Diseases.

The Mary Skeels Gradle Memorial Fund

Mr. Walter Gradle, Lit. 1900, of Chicago, Illinois, has given to the University Hospital for the use of the Children's Ward, the sum of $1,000, to be known as the Mary Skeels Gradle Memorial Fund.

Fund of the Class of 1890

Some years ago this class raised a sum of five hundred dollars to aid worthy students in finishing their courses. This amount has been paid and is in the hands of the treasurer of the University. In 1915 the class voted to raise an additional five hundred dollars to be added to this sum.

The Samuel M. Feinberg Memorial Fund

This fund was established in memory of Samuel M. Feinberg by his wife, Dr. Olga Pickman Feinberg, and his sister-in-law, Mrs. Simeon M. Feinberg. Mr. Feinberg was a student enrolled in the second class of the Medical school at the time of his death on December 20, 1918. This bequest of $600 is to be used in the form of loans to senior students enrolled in the Medical School.

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities, see page 101.

FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no student can enter upon his work until after such payment. For the rules governing Second Semester fees and the refunding of fees, see page 117.

MATRICULATION FEES.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

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ANNUAL FEE.—For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *two hundred dollars* for men, *one hundred ninety-six dollars* for women. This annual fee covers all necessary laboratory and demonstration course fees.

GRADUATION FEE.—For all alike, *ten dollars.*

LABORATORY AND DEMONSTRATION COURSE FEES.—As noted above under the general title of Fees and Expenses the annual fee which is charged each student covers all necessary laboratory expenses and no further payment of laboratory fee is required. However, in case of students, other than medical students, who may desire to elect any of the Laboratory or Demonstration Courses in the Medical School, the following fees are charged to cover necessary expenses:

Anatomy	$20.00
Bacteriology	15.00
Physiological Chemistry	15.00
Histology	10.00
Physiology	5.00
Pharmacology	5.00
Pathology	10.00
Operative Surgery	10.00
Demonstration Course in Physical Diagnosis	5.00
Demonstration Course in Clinical Microscopy	5.00
Demonstration Course in Obstetrics	10.00
Demonstration Course in Neural Pathology	10.00
Demonstration Course in Ophthalmology	5.00
Demonstration Course in Oto-Laryngology	5.00

A deposit of the amount indicated for each of the above is required before the work of the course is begun.

PRACTITIONERS' COURSES.—A fee of *ten dollars* is charged to graduate students for each course taken, in addition to the ordinary laboratory expenses of the course.

The total amount of fees paid to the University during the whole four years' course for matriculation, incidental expenses, materials used, and graduation is, for Michigan students, about $580.00, and for all others, about $730.00, varying a little with the students' actual laboratory expenses.

For additional information in regard to expenses, see page 115.

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Law School*

A special Announcement, giving further information in regard to this School is published annually. For copies of this Announcement, or for other information relating to this School, address the Dean of the Law School, Ann Arbor, Michigan.

The Law School of the University of Michigan was opened in 1859. The first Faculty was composed of James V. Campbell, Dean, and Charles I. Walker and Thomas M. Cooley, Professors. With these men as founders and leaders, the growth and influence of the School were marked. The Faculty is now composed of twelve resident members, who devote themselves regularly and continuously to the work of instruction, and of several non-resident lecturers, who offer courses in special fields in law as indicated in the faculty list elsewhere in this catalogue.

Instruction is offered in all the branches of the common law, equity, the statute law of the United States, Roman law and some of its modern adaptations, and the science of jurisprudence. It is believed, however, that students are best trained for the practice of law by studying it not as mere dogma and collections of precedents, but with a broader view of its origin, development, and function. While, therefore, careful attention is given to practice, procedure, and the other so-called practical features of the law, strong emphasis is also laid upon the importance of a scholarly grasp of the law as a science. The greater part of the instruction is given by means of the free discussion of legal principles as disclosed in reported cases. This analytical study is supplemented by the practical and concrete features of the work in the practice court, in trial practice, and the other procedural courses. Work of this character is so arranged as not to interfere with the thorough and systematic study of the theory of the law. After years of experimentation with and development of these courses, results have been obtained which justify the Faculty in believing that this work is of value, not only in training students in procedure but principally as throwing a clarifying and vivifying light upon the theory of both procedural and substantive law.

There can be little doubt that the conceded efficiency of the mod-

* Formerly known as the Department of Law.

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ern law school in our better universities is due in large part to the fact that the instruction has been confined to the main purpose for which law schools are established, viz., the study of law, to the exclusion of all courses and methods which do not admit of dealing with first-hand material, and in such way as to require intensive thinking by the student. While the primary function of law schools is to train men to practice law, nevertheless, in order that there may be opportunity for the training of law teachers, scholars and writers, the time has undoubtedly come when instruction of an advanced nature should be offered in some of the university law schools. To meet this requirement this Law School offers *advanced* instruction in jurisprudence, the comparative study of law, history of law, philosophy of law, the Roman law and other related subjects. A detailed announcement of these courses will be found on page 505, and also in the Announcement of the Graduate School.

The academic year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922.

For information concerning the summer session of this School, the chapter on the Summer Session.

DIRECTIONS TO APPLICANTS

ADMISSION

Before admission to the School, or to the entrance examination, the applicant is required to present to the Dean the Treasurer's receipt for payment of the matriculation fee and the annual fee. It is essential, therefore that he apply first to the Secretary at his office in the Law building, register his name as a student in the Law School, and pay his fees to the Treasurer of the University. He is then entitled to apply for admission. In case of rejection, the money paid preliminary to the examination is refunded by the Treasurer.

REQUIREMENTS FOR ADMISSION

Applicants for admission to the first year class must be at least nineteen, to the second class, twenty, and to the third year class, twenty-one years of age. Applicants for admission to the fourth year class or as special students must be at least twenty-one years of age. Every applicant for admission, whether as a regular or as a special student must present a certificate of character. This may be in the form of a certificate of graduation, or of honorable dismissal from the school with which the applicant was last connected, or, in the case of special students who cannot present these, in the form of a general letter as to character.

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WHEN STUDENTS MAY ENTER

Students should enter at the beginning of the first semester or of the Summer Session, though under special circumstances they may enter, with the special permission of the Dean, at the beginning of the second semester. In any case, for students not entering upon advanced standing. a full three years residence is required to complete the curriculum. For this purpose three Summer Sessions count as one year. In any case students are expected to enroll at the opening of the session. Those who enter late necessarily lose much of the work, and absences at that time are treated like other absences in reducing the number of hours of credit that may be earned. In no event can students who present themselves more than a month after the opening of any session be permitted to work for credit toward graduation during that session.

Candidates for advanced standing must present themselves for examination one week before the opening of the School.

ADMISSION AS A CANDIDATE FOR A DEGREE

Graduates of approved universities or colleges and students who, in addition to an academic or high school course of four years, have satisfactorily completed two full years of work in an approved university or college, are admitted to the school as candidates for the degree. The school does not specify any particular subjects which must be taken during the required years of college work. In general, students are advised to take such courses as those suggested for a two-yeai preliminary curriculum in the College of Literature, Science, and the Arts, of this University on page 150. Work of high school or academic grade taken during the college year will not be accepted as meeting the requirement of a college year. College courses in which there are unremoved conditions or other deficiencies will not be accepted.

In all cases the applicant should present to the Dean of the School, before the time of application for admission, evidence that he comes within some one of the classes named. This, in the case of a university or college graduate, should be in the form of a certificate of graduation; in the case of other applicants, in the form of a certificate showing in detail the conditions of admission and the university or college work accomplished, and including an honorable dismissal signed by the proper authority. *A diploma will not be accepted as evidence of the completion of the required work.* Such certificates, when filled out, should be mailed to the Dean of the school at the earliest possible time. *The applicant will save time and prevent inconvenience and possible confusion by filing his credentials before September first.*

The college or university work required for admission to the Law School is entirely distinct and separate from law work and cannot

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be taken in the Law School. It must be pursued in the College of Literature, Science, and the Arts of this University, or in some other approved college or university.

All students planning to pursue this required college work in this University preliminary to entering the Law School should make their applications for admission to the Registrar. Students who have taken their college work in other colleges or universities, should make their applications for admission directly to the Dean of the Law School.

ADMISSION OF SPECIAL STUDENTS

Persons who are more than twenty-one years of age, but whose preliminary training has not been sufficiently extensive to satisfy the requirements for admission as special students, *may, in exceptional cases,* be admitted as special students. The entry of special students is not encouraged. Applicants for admission under this rule must submit to the Dean recommendations as to character and evidence of the possession of general education, maturity, experience, and exceptional ability that may be considered a fair equivalent of the formal preliminary requirements made in the case of regular students.

No one should present himself for admission as a special student until he has first received from the Dean assurance that his application has been favorably acted upon.

ADMISSION TO ADVANCED STANDING

Admission to advanced standing is upon examination. Persons who have the necessary qualifications for admission to the school, and who have satisfactorily completed work in an approved law school, may, upon presentation of a certificate of scholarship and of honorable dismissal from such school, become candidates for advanced standing in the school to the extent of the work so completed. The certificate should show the nature of the work, the time it was pursued, the text books used, and the grades received.

All candidates for advanced standing should secure the above mentioned certificates of preparatory work and of legal study and send them to the Dean of the school before presenting themselves for admission. He will then inform them whether they may receive advanced credit and the time that will probably be required to complete the course.

In the fall of 1921 examinations for admission to advanced standing will be held from September 19 to 26. All candidates are expected to communicate with the Secretary of the Law School before appearing for examination.

The summer session of the school offers advantages to applicants for advanced standing, which are explained in the chapter on the Summer Session.

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COMBINED CURRICULUM IN LETTERS AND LAW

The marked tendency of the day is toward an increasingly thorough equipment for every profession. In no profession has the standard of proficiency more rapidly advanced than in the law. Accordingly every student expecting to enter this school is urged to take as thorough and complete a collegiate course as his circumstances will permit. All who can do so are, therefore, urged to consider the combined curriculum in letters and law more fully described on page 149. It is the aim of this curriculum to provide a broad collegiate training with a thorough technical preparation for the practice of law.

SIX-YEAR COMBINED CURRICULUM

By taking the Combined Curriculum in Letters and Law it is now possible for students to shorten from seven to six years the time required to earn the degrees of Bachelor of Arts and Bachelor of Laws or Juris Doctor. The work of students who receive permission to enter upon the combined curriculum is under the supervision of the joint special committee consisting for the current year of Professors EFFINGER, BATES, HALL, HOLBROOK, and CROSS.

A fuller description of the combined curriculum may be found on pages 149 and 150, where may be found, also, for those who cannot take the full six-year curriculum, a suggested two-year program preliminary to the study of law.

CLASS RATING

It is expected that students will, at the time of their admission to the school apply for and obtain such class rating as they may desire and be entitled to, and that such rating will be final. But in case of subsequent unexpected change in circumstances or condition, application may be made to the Dean, at the beginning of a semester only, for a change in classification or work.

DEGREES

Three Year Curriculum (LL.B.)

The degree of Bachelor of Laws is conferred upon those students in the School who have met the entrance requirements for candidates for the degree, as stated on page 493, and who have satisfactorily completed the three year curriculum, in accordance with the regula-

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tions established by the faculty. For those who come without advanced standing in law, this means regular attendance throughout three University years, or the equivalent in University years and summer sessions. For this purpose, three summer sessions may be considered as the equivalent of one University year. This period of attendance may be proportionately reduced for students who enter upon advanced standing. In no case, however, will this degree be conferred upon any student who has not been in attendance for at least the entire senior year of the course.

Three Year Curriculum (J.D.)

The degree of Juris Doctor (J.D.) is conferred upon students who have obtained the degree of Bachelor of Arts, or a substantially equivalent degree, either in the College of Literature, Science, and the Arts, of this University, or in some other approved college or university, and who have pursued the study of Law in this School for three University years, or in any approved law school for one year and in this school for at least two years, and who have maintained an exceptionally high standard of scholarship in at least three-fourths of their law work, computed on the basis of hours of credit.

Fourth Year Curriculum (LL.M.)

The degree of Master of Laws will be conferred upon those students who hold the degree of Bachelor of Laws from an approved institution, and who have completed in this School a fourth year of work as prescribed by the faculty, and explained on page 505.

The Four Year Curriculum (LL.M. or J.D.)

Students who meet the entrance requirement of two years of college work and enter upon the four year curriculum may receive the degree of Master of Laws (LL.M.) or the degree of Juris Doctor (J.D.) according to the standard of scholarship maintained by them in the Law School. The degree of Juris Doctor (J.D.) is conferred upon those students who have pursued the study of law for four years in any approved law school, of which at least two years, including the final year, must be taken in this School, and who have maintained an exceptionally high standard of scholarship in at least three-fourths of their law work, computed on the basis of hours of credit.

The degree of Master of Laws is conferred upon those students who have completed the four-year curriculum, as above set forth, and who have maintained a satisfactory standard of scholarship throughout, but not the exceptionally high standard required of those who receive the degree of Juris Doctor.

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REGULATIONS APPLICABLE TO ALL DEGREES

Credit earned in the summer sessions will be counted toward these degrees.

Only those who are present in person may receive diplomas on Commencement Day. Others who have satisfied all the requirements for graduation, including the payment of the graduation fee, will receive their degrees at a subsequent meeting of the Board of Regents.

The graduation fee of ten dollars must be paid to the Treasurer of the University at least twenty-five days prior to the date of graduation.

LIBRARY

The Law Library now contains over forty-five thousand volumes, including all the published reports of the courts of last resort of every state in the Union and those of most of the intermediate appellate courts, the Federal Courts, and the English, Scotch, Irish, and British Colonial Reports. Duplicate, and in some cases triplicate sets of several of these reports have been added. There is also an extensive collection of treatises and text-books, both English and American. Nearly complete sets of statutes and session laws of the United States, Great Britain and her colonies, and practically all of the American and English legal periodicals are in the Library.

The Library has been enriched by a number of gifts from friends of the University, including the Honorable Richard Fletcher, formerly one of the Justices of the Supreme Court of Massachusetts, the Honorable O. H. Dean, of Kansas City, and the heirs of the late Honorable Christian H. Buhl, of Detroit, the Honorable Samuel T. Douglass, formerly one of the Justices of the Supreme Court of Michigan, and the Honorable Thomas M. Cooley.

The General Library of the University, which contains more than four hundred thousand volumes, is open to use by students in the Law School. It is rich in works of interest and importance to the lawyer.

THE LAW CURRICULUM

Courses: Regulations as to Credit

To secure the degree of LL.B. or the degree of J.D. in the three year curriculum the student must complete three years of law work as prescribed by the regulations of the School; the scope of this work is indicated in the following pages. The curriculum is a graded one and extends through three years of nine months each. The student by entering upon his work in June may complete the full curriculum in three summer sessions and two full years. The courses offered in the summer session are described in a later chapter.

To secure the degree of Master of Laws (LL.M.) or the degree

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of Juris Doctor (J.D.) in the four year curriculum the student must complete four years of work as prescribed by the regulations of the School; the scope of this work is indicated in the following pages. The four year curriculum is also a graded one, and extends through four years of nine months each. Work taken during the summer session is counted toward the degrees in this curriculum, and as three summer sessions are the equivalent of one full year of work, various combinations for saving elapsed time may be made.

COURSES OF INSTRUCTION

The following is a statement of the work offered in the School. Without special permission from the Faculty not more than 13 hours can be elected in any semester after the first semester of the first year. At the opening of each semester a schedule showing the hours of recitations and the books used in the various courses is published and distributed.

FIRST YEAR

FIRST SEMESTER

Common Law Pleading.—Three hours a week. Professor SUNDERLAND.

Contracts I.—Formation of a contract, parties to contracts, and the Statute of Frauds. Four hours a week. Professor AIGLER.

Criminal Law and Procedure.—Two hours a week. Professor WAITE.

Property I.—The law of personal property; also in the law of real property, the topics of tenure, estates, seisin, statute of uses, fixtures, emblements, and waste. Three hours a week. Professor DRAKE.

Torts.—Three hours a week. Professor WILGUS.

SECOND SEMESTER

Common Law Pleading (Continued).—Two hours a week. Professor SUNDERLAND.

Contracts II.—Operation, interpretation, and discharge of contract. Four hours a week. Professor AIGLER.

Criminal Law and Procedure (Continued).—Two hours a week. Professor WAITE.

Property II.—Natural rights, profits, easements, covenants running with the land at law, equitable restrictions, public rights, and rents. Three hours a week. Professor SHARTEL.

Torts (Continued).—Two hours a week. Professor WILGUS.

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SECOND YEAR

FIRST SEMESTER

Equity.—Three hours a week. Professor DURFEE.

Evidence.—Two hours a week. Professor LANE.

Electives.—Seven or eight hours.

SECOND SEMESTER

Equity (Continued).—Three hours a week. Professor DURFEE.

Evidence (Continued).—Two hours a week. Professor LANE.

Electives.—Seven or eight hours.

THIRD YEAR

FIRST SEMESTER

Electives.—Twelve or thirteen hours.

SECOND SEMESTER

Electives.—Twelve or thirteen hours.

FOURTH YEAR

FIRST SEMESTER

Roman Law.—This course will be made an introduction to comparative law, with a study of selections from the Roman Corpus Juris, treatises on modern civil law and the modern codes and, so far as may be possible, the tracing of the development of fundamental legal concepts in the derivatives of the Roman system. Pound's "Readings in Roman Law" will be used as the basis of the course, but a reading knowledge of Latin and of French or German is most desirable. Three hours a week. Professor DRAKE.

Electives.—Nine or ten hours.

SECOND SEMESTER

Jurisprudence.—The philosophic bases of law, a study of the concept of justice and its relation to law in the Continental and English systems. The course will be given as a proseminary, with lectures by the instructor and topical studies and reports by the students. The various systems of judicial philosophy will be examined with the purpose of determining, if possible, their bearing upon the practical problems of our present day law. No text-book will be used but the several volumes of the "Legal Philosophy Series" will be drawn upon for the studies and reports. Three hours a week. Professor DRAKE.

Electives.—Nine or ten hours.

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ELECTIVES

In addition to the above prescribed courses, each candidate for a degree will elect, from the following courses, enough hours to complete the requirements for a degree. Except when the contrary is expressly stated, all of the following courses will normally be offered every year. As to a few of these courses, however, the right is reserved to omit them, or to give them only in alternate years, in case such action is required.

Agency, including Master and Servant.—Two hours a week for the year. Professor DICKINSON.

Bailments and Carriers.—Brief consideration of bailments in general, and particular attention to the law of pledge, innkeepers and common carriers of goods; carriers of passengers; the Post Office, and telegraph and telephone companies, as carriers of messages. Two hours a week. Professor GODDARD.

Bankruptcy.—Proceedings under the Bankruptcy Act, including the law of fraudulent conveyances. Two hours a week. Professor HOLBROOK.

Bills of Exchange and Promissory Notes.—Includes a study of the Negotiable Instruments Law as enacted in many of the states. Three hours a week. Professor WAITE.

Code Pleading.—Two hours a week. Professor SUNDERLAND.

Conflict of Laws.—A study of the law that governs in transactions between parties in different states, or in foreign countries, where the laws of the different states, or countries, as to the matter involved, are diverse. Three hours a week. Professor LANE.

Constitutional Law I.—General principles of constitutional law, federal and state. Making and changing constitutions; function of judiciary in enforcing constitutions; separation and delegation of governmental powers; political and civil rights; interstate privileges and immunities of citizens; due process and equal protection of law; police power; taxation; eminent domain. Three hours a week, first semester. Professor BATES.

Constitutional Law II.—The Federal Government. General scope of federal powers; money, banking, postal, and military powers; foreign relations; territories, dependencies, and new states; federal taxation; regulation of commerce; intergovernmental relations; jurisdiction of federal courts. Three hours a week, second semester. Professor BATES.

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Corporations, Private.—Two hours a week for the year. Professor WILGUS.

Damages.—Two hours a week. Professor DRAKE.

Domestic Relations.—Husband and wife, parent and child, infancy. Two hours a week. Professor HOLBROOK.

Insurance Law.—History, nature, and general principles of insurance law; fire, life, accident, and marine insurance. Two hours a week. Professor LANE.

Irrigation Law—Riparian rights in general; their extent, use and protection; the doctrine of appropriation; initiation of rights; priorities; transfer and extinguishment of rights; underground waters; interstate streams. Two hours a week. Professor HOLBROOK. (This course will not be given in 1920-1921, but will be given in 1921-1922 and in alternate years thereafter.)

Jurisprudence.—The object of this course is to give students, after their study of the various branches of the law in isolation, a systematic and comprehensive study of the few underlying principles of all law; taking Pound's "Readings in Jurisprudence" as the basis of lectures and recitations. Three hours a week. Professor DRAKE.

Medical Jurisprudence.—A course of lectures on Medical Jurisprudence will be offered by Mr. LIGHTNER, of the Detroit Bar. No credit is given for this course.

Mining Law.—The discovery and location of lode and placer claims under the mining laws; assessment work; extra-lateral rights; adverse claims; mining claims and other public-land rights; mining partnership. (This course will be given in 1920-1921 and in alternate years thereafter.) Two hours a week. Professor HOLBROOK.

Mortgages.—Real property mortgages; essential elements of the mortgage; nature and incidents of the mortgage relation; extent of the mortgage lien; priorities, including the operation of the recording acts; redemption and foreclosure; assignment of mortgages; conveyance of the equity of redemption, and marshalling. Two hours a week. Professor DURFEE.

Municipal Corporations.—Two hours a week. Professor HOLBROOK.

Oil and Gas Mining Laws.—Lectures by Mr. JAMES A. VEASEY, of Oklahoma.

Partnership.—Three hours a week. Professor DRAKE.

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Patent Law.—The fundamental principles, development, and interpretation of the statutes allowing special rights to inventors; the application of the law in findings of fact and a general survey of the procedure in suits on patents. Two hours a week. Professor WAITE.

Practice Court.—The purpose and nature of the work are explained on page 506. Class divided into groups of four. One hour each semester. Code Pleading is a prerequisite to the election of this course under the law of a Code state. Professor SUNDERLAND.

Procedure, Theory and Development of.—A critical study of the fundamental problems of remedial law, with the purpose of determining their essential scope and meaning and the possibilities open for their solution. The subjects taken up for investigation will include the jurisdiction and organization of courts, with a comparative study of American, English and Continental court systems, service of process, venue and appearance, problems relating to the use of the jury, simplification of pleadings, parties to actions, methods of raising points of law, control of the court over the proceedings in the cause, discovery, reference and agreed case, settlement after action brought, declaratory judgments, summary judgments, special verdicts, interrogatories and findings, new trials, judgment notwithstanding a contrary verdict, appeal and error. The material used will consist largely of selected statutes and court rules taken from many jurisdictions, both American and British, with a view to exhibiting the best and most important modern methods for dealing with the procedural problems here indicated. A proper historical perspective will be preserved by a constant comparison of the new methods with those employed by the common law and chancery practice. Open only to third and fourth year students. Two hours a week. Professor SUNDERLAND.

Property III.—Titles to real estate *inter vivos*. Four hours a week. Professor SHARTEL.

Property IV.—Future and Conditional Estates. Two hours a week for the year. Professor GODDARD.

Public International Law.—Two hours a week for the year. Professor DICKINSON.

Public Officers and Extraordinary Legal Remedies.—These subjects are treated in one course, as cognate to and supplementary of each other, the case selected at the same time developing the law of extraordinary legal remedies and illustrating the law of public officers. Nature of office; eligibility; appointment and

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election; acceptance; qualifying; officers *de facto;* validity of contracts concerning offices and officers; resignation; removal; acceptance of incompatible office; rights, duties, and liabilities of officers; mandamus; quo warranto; prohibition; certiorari; procendendo; habeas corpus. Two hours a week. Professor HOLBROOK.

Public Service Law.—A study of the rights, duties, and regulation of utilities affected with a public interest, including valuation and rate regulation, but excluding the law of common carriers in so far as it has been treated in the course in Bailments and Carriers. Two hours a week. Professor GODDARD.

Quasi-Contracts.—The doctrine of unjust enrichment—recovery of benefits conferred under various forms of constraint and mistake, and in performance of contracts which are unenforceable by reason of illegality, the statute of frauds, impossibility of performance or breach; waiver of tort and restitution as a remedy for breach of contract. Two hours a week. Professor DURFEE.

Sales.—Transfer of title to personal property as the result of contract; rules for determining intent as to relative time of its transfer; effect of fraud in the inducement of the contract; rights and remedies of the parties to the contract, and of other parties affected by it; warranties and their effects. Three hours a week. Professor WAITE.

Suretyship.—Two hours a week. Professor DURFEE.

Trial Practice.—A study of the principles controlling the various steps in civil trials at law. The course will include the theory and practice relating to the issuance of service and return of process; appearance, both general and special; continuances; the right to a jury trial and the empanelling of the jury; the right to open and close; the opening statement of counsel; judgment on the pleadings; demurrer to the evidence; dismissal, non-suit, and directed verdict; instructing the jury; argument and conduct of counsel; special interrogatories and special verdicts; judgment notwithstanding the verdict and in arrest of judgment; new trials; and trial and findings by the court. Two hours a week. Professor SUNDERLAND.

Trusts.—Two hours a week for the year. Professor DICKINSON.

Wills and Administration.—Gifts *causa mortis;* descent and distribution, testamentary capacity; execution; revocation and revival of wills; construction of wills; ademption and lapse of legacies; executors and administrators; payment of legacies; distribution of estate. Three hours a week. Professor GODDARD.

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SUMMER SESSION

The summer session of the Law School continues for ten weeks; it is divided into two terms of five weeks each. The courses given are identical with the corresponding courses of the regular session, full credit toward graduation is allowed upon their completion, and the work is so arranged that a student who cares to avail himself of the summer session, by beginning his law study in June of any year, may save practically a year in the time required for graduation. Three summer sessions are equivalent to one of the three years of the course leading to a degree.

During the Summer Session of 1921 the following courses will be given:

FOR THE WHOLE SESSION, JUNE 27 TO SEPTEMBER 3

Common Law Pleading.—Six hours a week for the first half, nine hours a week for the second half (five hours credit).

Torts.—Nine hours a week for the first half, six hours a week for the second half (five hours credit).

Evidence.—Six hours a week for ten weeks (four hours credit).

Property III.—Six hours a week for ten weeks (four hours credit).

Corporations.—Six hours a week for ten weeks (four hours credit).

Property IV.—Six hours a week for ten weeks (four hours credit).

FOR THE FIRST HALF, JUNE 27 TO JULY 30

Quasi-Contracts.—Six hours a week for five weeks (two hours credit).

Sales.—Nine hours a week for five weeks (three hours credit).

FOR THE SECOND HALF, AUGUST 1 TO SEPTEMBER 3

Code Pleading.—Six hours a week for five weeks (two hours credit).

Equity I.—Nine hours a week for five weeks (three hours credit).

SPECIAL COURSES

The following courses of special lectures, given at intervals during the year, are open to members of the second and third year classes.

Admiralty.—Lieut. Commander FAUST.

Copyright Law.—Mr. REED.

Legal Ethics.—Mr. MAXWELL.

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Medical Jurisprudence.—Dr. VAUGHAN, and Mr. LIGHTNER.

Michigan Statute Law.—Mr. BOUDEMAN.

Roman Law, Advanced Course.—Professor DRAKE.

Investment Securities.—Mr. BOUDEMAN.

Trade-mark Law.—Mr. ROGERS.

FOURTH YEAR CURRICULUM

The degree of Master of Laws is conferred upon persons holding the degree of Bachelor of Laws, granted by this University or by any approved Law School, provided that the applicant has maintained a high standard of scholarship in the law school from which he obtained his degree, and has completed a fourth year of law study as prescribed by the Faculty.

Graduates of the Law School of the University of Michigan will be admitted as candidates for the degree of Master of Laws only upon obtaining permission of the Dean. Those who have received their degrees from other law schools must present certificates from such schools showing in detail the courses taken and the scholarship grades obtained in each course, and must, in addition, present a statement from the Dean, or other officer of such school, to the effect that the applicant is qualified to pursue further work in law and is recommended therefor. This may be in a separate communication, or in the certificate above referred to. It is proposed to admit to the course only those students whose records indicate that they are above mediocrity and will derive genuine benefit from further law work.

Candidates for the degree of Master of Laws shall take not less than ten nor more than twelve hours of work each semester. This work shall be elected:

(a) from courses given in this school for which the candidate has not already received credit, if he be a graduate of this school, and of which he has not the equivalent, if he be a graduate of any other law school. All graduates for this degree shall be required to take courses in Roman Law and in the Science of Jurisprudence, provided they have not received credit for said courses or their equivalents. And, to a limited extent,

(b) from courses offered by the College of Literature, Science, and the Arts, directly connected with or collateral to some phase of the law.

The following courses offered in this school are open only to graduate students.

The Elements of Roman and Comparative Law.—Lectures and recitations. An outline of the fundamental principles of Roman and Comparative Law as given in Pound's Readings in Roman Law. Three hours a week, first semester. Professor DRAKE.

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Roman Law.—Selected Titles of the Digest. Readings, interpretations, and critical discussion of

(a) De Adquirendo Rerum Dominio, XLI, 1; *De Adquirenda vel Amittenda Possessione,* XLI, 2. Two hours a week, second semester. Professor DRAKE.

(b) De Obligationibus. Two hours a week, second semester. Professor DRAKE.

History of Legal Philosophy, Proseminary.—A study of the chief schools of legal philosophy of ancient, medieval, and modern periods. Three hours a week. Professor DRAKE.

THE PRACTICE COURT

It has been an objection frequently urged against the completeness of the training given in law schools that the students acquire no knowledge of actual practice. This objection has been largely removed by the introduction into this school of the Practice Court. The Practice Court is a part of the school, and is presided over by the Professors of Practice, while the other members of the Faculty co-operate in conducting it. Its work is divided into three parts, that of the law term, that of the jury term, and that of the appellate jurisdiction. The court is provided with a full corps of officers, including the member of the Faculty who may sit from time to time as a presiding judge, the full bench of judges sitting as a Supreme Court, a clerk, a sheriff, and the necessary deputies. Ample and commodious rooms have been provided for the use of the court, including a court room furnished with the fittings necessary for the trial of jury cases, and a clerk's office. The latter is provided with the books and records used in actual practice.

The purpose of the court is to afford to the student practical instruction in pleading and practice both at law and in equity, under the common law system and the code of reformed procedure, and actual experience in the commencement and trial of cases through all their stages. In commencing the actions, the students assigned to the case are permitted to select the state in which the action is supposed to be brought, thus enabling the student to acquire the practice as prevailing in his own state. All questions of practice, pleading, and procedure are governed by the law of the state in which the action is so laid, but questions of substantive law are determined according to the weight of authority.

Two classes of cases are presented:

First.—Cases arising upon given statements of facts, prepared and assigned by the Professors of Practice, upon which process is to be issued, pleadings are to be framed, and the cause conducted to an issue, when it is argued and disposed of as a question of law upon the facts submitted. This class of cases affords the student practical experience in the commencement of suits, the preparation of

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pleadings, and the argument of the questions of law arising upon the facts. The practice and pleadings are under the common law or the code procedure, as the student may elect. There are three public hearings in this course. *a.* The questions arising upon the pleadings are argued and disposed of at a regular session of the court presided over by the Professors of Practice. *b.* After the case is at issue the pleadings are carefully examined by one of the Professors of Practice, and are discussed and criticized in detail with the men who draw them, and amendments are required whenever deemed advisable. *c.* After the pleadings have been approved, the case is set down for a separate hearing upon the questions of law. This argument is heard by some member of the Faculty to whom an exhaustive brief on the law of the case must at the same time be submitted.

Second.—Actual controversies are arranged and assigned for trial as issues of fact. The course includes the entire conduct of an actual case from its beginning to a final judgment. This involves the issue of proper process, the preparation and filing of appropriate pleadings, the subpœnaing of the witnesses, the impaneling of a jury, the examination and cross-examination of witnesses, the arguments to the court and jury, and all other incidents of contested trial.

For the purpose of this work, the class is divided into sections, and the work of attorneys, witnesses, jurors, and the like, is performed by the students. A member of the Faculty presides on the hearing or trial of each case, and it is conducted with all the dignity and decorum of actual practice.

MICHIGAN LAW REVIEW

THE MICHIGAN LAW REVIEW is a legal periodical conducted under the auspices of the Law School. It is edited by an Editorial Board chosen from the Law Faculty, but all members of the Faculty co-operate in conducting it. Students selected from the second and third year classes act as editorial assistants.

The purpose is to give expression to the legal scholarship of the University, and to serve the profession and the public by timely discussion of legal problems, and by calling attention to the most important developments in the field of jurisprudence.

THE REVIEW is made up of four chief departments: First, leading articles upon important and interesting legal subjects; second, notes and comments upon current topics and significant occurrences in the legal world; third, abstracts and digests of the most important recent cases; and fourth, reviews of books and comments on legal literature.

It is the aim to make the REVIEW practical without usurping the functions of the text-book or the digest, and scholarly without being so academic in character as to be out of touch with the needs

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and aims of the lawyer of today. It contains about eighty pages in each issue, and regularly appears on the first of each month during the academic year. The enterprise is in no sense conducted for the pecuniary benefit of those engaged in it, or any of them. All profits which may accrue are devoted to the improvement of the magazine.

Special subscription rates are provided for students in the School. It is recommended that general advantage be taken of this opportunity to keep in touch with current legal problems and literature.

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For rules governing participation in public activities see page 110.

FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no student can enter upon his work until after such payment. For the rules governing Second Semester fees and the refunding of fees, see page 117.

MATRICULATION FEES.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *one hundred five dollars,* for men, *one hundred one dollars* for women; for all others, *one hundred twenty-five dollars* for men, *one hundred twenty-one dollars* for women.

GRADUATION FEE.—For all alike, *ten dollars.*

For additional information in regard to expenses see page 115.

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College of Pharmacy*

A Special Announcement giving further information in regard to this College is published annually. For copies of this Announcement, or for other information relating to the school, address The College of Pharmacy, Ann Arbor, Michigan.

The College of Pharmacy of the University of Michigan was organized as an independent unit of the University on December 29, 1876. Previous to that time (from December 22, 1868) special instruction in Pharmacy had been given as a part of the curriculum of the College of Literature, Science, and the Arts. It was the first of the University Colleges of Pharmacy in the United States. It is essentially an assembled college since all subjects in the curriculum other than Pharmacy are given by members of the faculty of each department of specialization of the various colleges composing the University. Thus, without additional expense to the State competent authority in each subject is available.

The College of Pharmacy provides instruction in all branches of Pharmacy and related chemical pursuits. Graduates are assured of such thorough training in both commercial and professional pharmacy that they may regard the passing of State Board Examinations as incidental to their qualifications, rather than the achievement for which they have been striving. The course includes a broad and extended training in chemistry, thus preparing each student for service as a manufacturing chemist, or as an analytical chemist. He is furthermore in a position to meet the demands of food or drug manufacturers, who must at all times maintain the standard of purity and high quality required by the State and Federal laws.

The schedule of studies has been outlined with intent to occupy the entire time of each student. In case a student finds it necessary to work outside to help defray expenses, he must expect to elect fewer hours of University work. This College offers decided advantages, in that it requires the same high standards of scholarship as all other schools and colleges of the University and gives excellent mental and physical discipline in the pursuance of severe studies and exact operations by each student.

The college year extends from Tuesday, September 27, 1921, to

* Formerly known as the School of Pharmacy.

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Monday, June 19, 1922. Students of the first year are released the second Friday before Commencement.

For the full regular work, admission cannot be granted at any other time than at the opening of the first or the second semester (February 13, 1922), as students are instructed in classes in progressive order. For investigation, or special studies, students can be received at any time when there is room in the laboratories. Many of the subjects taught in the College can also be taken in the Summer Session of the University (see a subsequent chapter).

REQUIREMENTS FOR ADMISSION

Applicants for admission as undergraduates must be at least sixteen years of age, and must have completed the requirements for admission as here described. These requirements are stated in units, a unit meaning the equivalent of five recitations a week in one branch of study for one year, amounting in the aggregate to not less than one hundred twenty sixty-minute hours in the clear. Two to three hours laboratory, drawing, or shopwork, will be counted as equivalent to one of recitation.

Plan A. For the graduates of all the accredited schools except those entitled to optional privilege of Plan B.

The fifteen units presented for admission on certificate must include twelve units from Group I and three additional units from either Group I or Group II. It is, however, strongly recommended that one or more studies be pursued throughout the four years of the high school course. The fifteen units must include the following:

English	3 units
Foreign Language, any one	2 units
Greek, Latin, French, Spanish or German	
Algebra	1 unit
Geometry	1 unit
Physics	1 unit
Chemistry	1 unit

Plan B. Graduates of schools on the approved list of the North Central Association of Colleges and Secondary Schools will be admitted upon the presentation of a recommendation covering not less than fifteen units, of which twelve must be from Group I, including Physics and Chemistry, one unit each. The other three units may be from either Group I or Group II. Admission on this basis of recommendation may be granted also to the graduates of other especially approved schools.

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SUBJECTS ACCEPTED FOR ADMISSION

The subjects from which choice may be made, and the number of units which will be accepted in each subject are as follows:

Group I. Twelve Units Must Be Chosen from This Group

English Composition, 3 units.
English Literature, 1 unit.
Greek, 2 or 3 units.
Latin, 2, 3, or 4 units.
French, 2, 3, or 4 units.
German, 2, 3, or 4 units.
Spanish, 2, 3, or 4 units.
History, 1, 2, or 3 units.
Algebra, 1, 1½, or 2 units.
Geometry, 1, or 1½ units.
Trigonometry, ½ unit.
Physics, 1 unit.
Chemistry, 1 unit.
Botany, ½ or 1 unit.
Zoölogy, ½ or 1 unit.
Physiology, ½ unit.
Geology, ½ unit.
Physiography, ½ or 1 unit.
General Science, ½ or 1 unit.

Group II. Three Units May Be Chosen from This Group

Group II comprises any subjects not listed in Group I which are counted toward graduation by the accredited high school from which the applicant receives his diploma. Such subjects as Agriculture, Domestic Science, Domestic Art, Drawing, Manual Training, Music, Normal Training, etc., are included in this group.

Credentials, in order to be recognized must be sent by the superintendent or principal directly to the Dean. This may be done at any time of the year upon the appropriate blank furnished by the Dean.

From Colleges

Students who have completed at least one year's work in an approved college of literature and science, and who bring explicit and official certificates describing their course of study and scholarship, and testifying to their good character, are admitted without examination.

ADMISSION TO ADVANCED STANDING

Students who have gained admission to the college may apply for credit in any of the college studies which they have pursued in another college. Advanced credit is granted for subjects studied in the high school when the student has taken a post-graduate high school course of at least one semester. Applicants are requested to present explicit credentials as to the work done. *Credits from other Colleges of Pharmacy are adjusted separately for each study, as stated above. Owing to differences in the order and extent of the studies, credits cannot usually be counted in years of pharmaceutical college study.* Applicants by correspondence before the opening of college, may have their credentials acted upon for advanced standing.

Credits are received from the other departments, and from the Summer Session, of this University.

One year of residence is required before a degree can be granted.

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ADMISSION OF STUDENTS NOT CANDIDATES FOR A DEGREE

Persons over nineteen years of age may be admitted to pursue selected studies upon passing an examination in writing, spelling, use of capitals, and grammatical construction.

Students admitted under the above provisions are not, however, regarded as candidates for a degree, and they do not become eligible for graduation until they have passed all the examinations for admission to the College.

Students not candidates for a degree may elect such studies as they are prepared to pursue, under the regulations of the Faculty. Selected studies may be continued as long as, in the judgment of the Faculty, they are carried with success and profit.

APPLICANTS FOR ADMISSION

Applicants arriving in Ann Arbor should call at the office of the Secretary, Room 252, in the Chemistry and Pharmacy Building.

REGISTRATION—IMPORTANT

All students in the College of Pharmacy are required, at the beginning of each year of residence, to enroll with the Dean, to pay their fees to the Treasurer of the University, and to file with the Secretary of the College of Pharmacy an election blank properly filled out, showing the courses they expect to pursue during the semester. These three things shall be considered as constituting Registration in this College.

All students entering this College for the first time must present their credentials to the Secretary of the College of Pharmacy and secure acceptance before enrolling.

ELECTION OF STUDIES

The election blanks of all students must be presented in person to the Secretary of the College of Pharmacy before 6 P. M. of the first Wednesday after the opening of the first semester, and before 6 P. M. of the first Saturday preceding the opening of the second semester.

They can be presented after these dates only upon payment of $1.00.

Elected studies cannot be dropped without the permission of the Dean. No credit is given for courses not properly elected.

Elections may be changed during the first week of each semester.

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RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities see page 110.

COURSES OF INSTRUCTION

The courses of instruction comprise lectures, recitations, and laboratory work. The amount of work in each course is expressed in hours, an *hour* signifying one exercise a week during one semester. A lecture or recitation is usually one hour in length. A laboratory exercise occupies approximately three or four hours, being continued until the work assigned to one exercise, or a due proportion of work assigned to the course, has been completed. The satisfactory completion of one exercise a week during one semester, including a sufficient standing in the examination held at the end of the semester, entitles the student to *one hour of credit* toward graduation. It is expected that a lecture or a recitation with the personal study necessary to maintain the student's standing in the subject, will take in all as much as a laboratory course. Therefore an *hour of credit* is regarded as having the same value whether obtained in a course of lectures or in a course of laboratory exercises.

The amount of credit toward graduation is indicated by the expressions: *two hours, three hours,* etc.

BACTERIOLOGY

2. Bacteriology. Lectures. *Five hours.* Second semester. Medical Amphitheatre. Professor NOVY.

3*a*. Bacteriology. Laboratory work. *Three hours.* Begins about the first of December and ends about the first of March. Assistant Professor HADLEY.

BOTANY

1*p*. Elementary Structural Botany. *Three hours.* Lectures and laboratory. First semester. Mr. LA RUE.

NOTE.—Additional courses in Botany are given in the announcement of the College of Literature, Science, and the Arts.

BUSINESS ADMINISTRATION

38*p*. Elements of Accounting and Business Methods. Lecture, recitation, and laboratory practice. *Two hours.* Second semester. Dr. HAUHART.

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CHEMISTRY

A and *A*1. Inorganic Chemistry, Descriptive and Experimental. Lectures and laboratory. *Six hours.* Deposit of $5 required. First semester. Professor LICHTY, and Assistants.

3*b*. Qualitative Analysis. Lectures and recitations. *Seven hours.* Deposit of $10 required. Second semester. Mr. MCALPINE, and Assistant.

4. Pharmaceutical Chemistry. Lectures, recitations, and laboratory. *Two hours.* Second semester. Mr. WAGENER.

5. Quantitative Analysis. Lectures, recitations, and laboratory. *Five hours.* Deposit of $10 required. First or second semester. Professor WILLARD, and Assistant Professor MELOCHE.

7. Organic Chemistry. Lectures, recitations, and laboratory. *Five hours.* Deposit of $10 required. First semester. Professor GOMBERG, and Assistant Professor SCHOEPFLE.

Those electing Course 7 should elect 7*a* the following semester, as they constitute one course extending throughout the year.

7*a*. Organic Chemistry. Continuation of Course 7. Lectures, recitations, and laboratory. *Four hours.* Deposit of $10 required. Second semester. Professor GOMBERG, Assistant Professor SCHOEPFLE, Mr. SNOW, and Mr. SULLIVAN.

8. Elementary Theoretical and Physical Chemistry. Lectures, recitations, and laboratory. *Four hours.* Second semester. Professor BIGELOW.

This course must be preceded by Chemistry 3 or 3*b* and Physics 2.

10. Organic Chemistry. Lectures and recitations. *Four hours.* Second semester. Assistant Professor SCHOEPFLE, and Mr. SNOW.

13. Physical-Chemical Measurements. Laboratory work. *Three to eight hours.* Deposit of $5 required. Either first or second semester. Professor BARTELL.

15. History of Chemistry and Development of Chemical Theory. Lectures and seminary. *Two hours.* Either first or second semester. Professor SMEATON.

42. Organic Chemistry. Laboratory work in organic synthesis. *Two hours.* Deposit of $10 required. Either first or second semester. Assistant Professor SCHOEPFLE.

44. Organic Analysis. Alkaloids and Synthetics. Lectures, recitations, and laboratory. *Four hours.* Deposit of $5 required. Second semester. Professor KRAEMER, and Assistant.

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44*a*. Analysis of Foods, Drugs, etc. Lectures, recitations, and laboratory. *Three or five hours.* Deposit of $5 required. This course must be preceded by Course 5 and 7. Assistant Professor GLOVER.

44*b*. Analysis of Foods, Drugs, etc. Continuation of Course 44*a*. *Three or five hours.* Fee, $15 to $20. Second semester. Assistant Professor GLOVER.

NOTE.—A more complete list of courses in Chemistry which are open to students of the College of Pharmacy may be found in the announcement of the College of Literature, Science, and the Arts.

SUMMER SESSION OF 1921

44*s*. Food and Drug Analysis. *Three* or *five hours.* Assistant Professor GLOVER.

HYGIENE

1. General Hygiene. Lectures. *Three hours.* Second semester. Dr. VAUGHAN.

MINERALOGY

1. Elements of Mineralogy. Lectures and laboratory. *Two hours.* The course the first semester is arranged especially for pharmacy students. Professor KRAUS, and Assistants.

Course 1 should be preceded by a course in general chemistry.

PHARMACOGNOSY

1. Microscopy of Food, Drugs, Spices, etc. Lectures and laboratory. *Four hours.* Second semester. Assistant Professor GLOVER, and Assistant.

2. Study of Crude Drugs. Lectures, recitations, and practical exercises. *Five hours.* First semester. Assistant Professor GLOVER, and Assistant.

SUMMER SESSION OF 1921

2*s*. Technical Microscopy. *Credit to be arranged.* Assistant Professor GLOVER.

PHARMACOLOGY

1. Materia Medica and Therapeutics. Lectures and recitations. *Four hours.* Second semester. Dr. EMERSON.

2. Physiological Assay of Drugs. Professor EDMUNDS.

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PHARMACY

1. Theoretical Pharmacy and Pharmaceutical Arithmetic. Lectures and recitations. *Four hours.* First semester. Assistant Professor STOCKING.

2. Commercial Pharmacy. Lectures and recitations. *Two hours.* First semester. Assistant Professor STOCKING.

3. Drug Assaying and Pharmacopœial Testing. Lectures, recitations, and laboratory. *Four hours.* Deposit of $5 required. First semester. Mr. MCGILL.

4. Prescription Practice and Incompatibilities. Lectures, recitations, and laboratory. *Three hours.* First semester. Assistant Professor STOCKING.

5. Prescription Practice and Incompatibilities. Compounding of prescriptions as met with in general practice. Continuation of Course 4. *One hour.* Second semester. Assistant Professor STOCKING.

6. Study of the United States Pharmacopœia and the National Formulary. Lectures and recitations. *Four hours.* Second semester. Assistant Professor GLOVER.

7. Pharmaceutical Technic and Manufacturing Pharmacy. *Seven hours.* Deposit of $5 required. Second semester. Assistant Professor STOCKING.

SUMMER SESSION OF 1921

1*s*. Theory of Pharmacy. *Four hours.* Assistant Professor STOCKING.

2*s*. Commercial Pharmacy. *Two hours.* Assistant Professor STOCKING.

7*s*. Manufacturing Pharmacy. *Four* or *seven hours.* Assistant Professor STOCKING.

3*s*. Pharmacopœial Testing and Drug Assaying. Assistant Professor GLOVER.

PHYSIOLOGICAL CHEMISTRY

1. Physiological Chemistry, including Analysis of Urine. Laboratory work and quizzes. *Three hours.* Fee, $15. First semester. Medical Building. Dr. EMERSON.

Course 1 is given twice, during the first semester only, and each class working for nine weeks.

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PHYSICS

1. General Physics. Mechanics, Sound, and Heat. *Four hours.* Lectures, recitations, and laboratory work. Professor RANDALL and Assistants.

2. General Physics. Magnetism, Electricity, and Light. *Four hours.* Lectures, recitations, and laboratory work. Instructors the same as in Course 1.

Course 2 must be preceded by Course 1 and by a course in general chemistry.

SUMMER SESSION

Many of the required courses outlined above may be pursued during the Summer Session of the University. Thus, Courses 1, 2, 3, and 7 in Pharmacy will be given during the Summer Session of 1921. For summer instruction in other departments, consult the announcements of the same, or the special bulletins of the Summer Session.

EXAMINATIONS

The examination upon each course of instruction is held at the end of each semester, in February and in June.

The result of an examination is reported by the Professor in charge, for each student enrolled, to the Faculty, in terms as follows: A (excellent), B (good), C (satisfactory), D deficient), E (not passed), I (incomplete), X (absent from final examination).

To receive credit in a course the grade reported must be above D. A student reported E (not passed) receives no credit for the course and must re-elect it at the first opportunity if the course is required for his graduation.

A student reported D (deficient) is required to do further work in the course; this may, at the option of the instructor, embrace any or all of the following requirements; the completion of set exercises or problems, attendance at designated classes and private study, or the completion of a satisfactory examination at one of the regular examination periods.

When a student has been prevented by illness or other cause beyond his control from completing any course, the mark I (incomplete), may be placed before the grade to denote that fact. This mark must be removed at the earliest opportunity or it becomes grade E (not passed).

Any student absent from examination is required to report to his instructor as soon thereafter as possible. If the student presents a valid excuse for his absence, the instructor shall permit him to take the examination at one of the regular periods. If the excuse is deemed unsatisfactory, the record shall be reported as D or E. If, by the

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end of the semester following the examination, no report showing a satisfactory completion of the course is received at the office, the record in the course shall be changed to E.

SEQUENCE OF STUDIES

NOTE.—The italic letter which precedes the name of a subject denotes the college in which it is offered. For information concerning any subject the student should consult the bulletin or announcement of the college indicated; *p* denotes College of Pharmacy; *a* College of Literature, Science, and the Arts; *e* College of Engineering; *m* Medical School.

Information concerning the courses mentioned in these schedules may be found in the preceding pages.

I. THREE YEAR CURRICULUM

Leading to the Degree of Pharmaceutical Chemist

First Year

FIRST SEMESTER			SECOND SEMESTER		
Subject	Course	Hours Credit	Subject	Course	Hours Credit
Chemistry, *p*	A & A1	6	Chemistry, *p*	3*p*	7
Botany, *p*	1*p*	3	Pharmacognosy, *p*	1	4
Pharmacy, *p*	1	4	Mineralogy, *a*	1	2
English, *e*	1	4	Economics, *p*	38*p*	2

Second Year

Chemistry, *p*	5	5	Pharmacy, *p*	7	7
German, *a* or *e*	1	4	Chemistry, *p*	4	2
Pharmacognosy, *p*	2	5	German, *a* or *e*	2	4
Pharmacy, *p*	2	2	Hygiene, *m*	1	3

Third Year

Chemistry, *p*	10	4..	Pharmacology, *p*	1	4
Chemistry, *p*	42	2	Pharmacy, *p*	5	1
Pharmacy, *p*	4	3	Pharmacy, *p*	6	4
Pharmacy, *p*	3	4	Bacteriology, *m*	2	5
Elective		2	Chemistry, *p*	44	4

Every candidate for the degree of Ph.C. (Pharmacy) must elect the subjects printed in Roman type and enough optional courses in addition to make in all 90 hours of credit.

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II. FOUR YEAR CURRICULUM

Leading to the Degree of Bachelor of Science (Pharmacy)

First Year

FIRST SEMESTER			SECOND SEMESTER		
Subject	Hours Course	Credit	Subject	Hours Course	Credit
Chemistry, *p*	A & A1	6	Chemistry, *p*	3*p*	7
Botany, *p*	1*p*	3	Pharmacognosy, *p*	1	4
Pharmacy, *p*	1	4	Mathematics, *a*	1	4
English, *e*	1	4			

Second Year

Chemistry, *p*	5	5	Pharmacy, *p*	7	7
German, *a* or *e*	1	4	German, *a* or *e*	2	4
Physics, *a*	1	4	Physics, *a*	2	4
Pharmacognosy, *p*	2	5	Mineralogy, *a*	1	2

Third Year

Chemistry, *p*	7	5	Chemistry, *p*	7*a*	4
Pharmacy, *p*	3	4	Bacteriology, *m*	2	5
Pharmacy, p	2	2	Chemistry, *p*	44	4
Elective		4	Hygiene, *m*	1	3
			Chemistry, *p*	4	2

Fourth Year

Pharmacy, *p*	4	3	Pharmacology, *p*	1	4
Chemistry, *p*	44*a*	3	Pharmacy, *p*	5	1
Bacteriology, *m*	3*a*	3	Pharmacy, *p*	6	4
Chemistry, p	13	3	Chemistry, *p*	8	4
Research		4	Accounting, *a*	38*p*	2

Every candidate for the degree of Bachelor of Science (Pharmacy) must elect the subjects printed in Roman type and enough optional courses printed in italics in addition to make in all one hundred and twenty hours of credit. In arranging studies at the beginning of each semester students must consult the Secretary, Room 252, Chemistry and Pharmacy Building.

GRADUATE COURSES

In Pharmacology, Bacteriology, and Physiological Chemistry

Graduates of the College are given opportunity to pursue advanced work in these studies. See page 471 for courses in Bacteriology and Physiological Chemistry, and page 476 for courses in Pharmacology, which are recommended to graduate students.

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For the Degree of Master of Science and Doctor of Philosophy

Advanced courses of study are offered in the several branches taught in the College, suitable for graduates who wish to earn the degree of Master of Science, or Doctor of Philosophy as explained in the chapter on the Graduate School.

FELLOWSHIPS AND SCHOLARSHIPS

The Prescott Memorial Scholarship

Alumni and friends of the College of Pharmacy have provided a permanent memorial to the late Doctor Albert B. Prescott in the form of a fund from which loans may be made to worthy students to assist them in meeting expenses while securing a pharmaceutical education. The fund is already sufficiently large to be available for this purpose, several loans having been made during the past year. Full information concerning the conditions under which loans are made can be obtained by addressing the Dean of the College of Pharmacy.

BOTANICAL GARDEN

In cooperation with the Botanical Garden of the University, there is a fairly extensive garden of the important medicinal plants. During the summers of 1918 and 1919 more than 20,000 plants, presenting nearly 60 different species, were under cultivation. Students have an opportunity of learning the principles of planting, harvesting, and preparation of drugs for the market, as well as the methods of extraction of active principles.

LIBRARY, BOOKS OF REFERENCE, AND TEXT-BOOKS

The College has an extensive library, which is shelved with the Chemical Library of the University, in the Chemistry and Pharmacy building. It contains complete sets of the journals, the original repositories of the sciences related to pharmacy, as well as the current periodicals of the profession, encyclopedias and hand-books of chemistry and pharmacy, and the latest works of value in study. These books are in constant use by students in connection with their laboratory work, and in preparing for their recitations. Files of current numbers of the journals of chemistry and of pharmacy are also kept in the reading-room.

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The text-books used can be obtained in the book stores in this university city at lower rates than those prevailing in the general trade of other cities. Since changes are likely to be made in the texts used from year to year it is not desirable to print a tentative list. The texts required in the several courses are announced by the teacher in charge at the first meeting of the class.

FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no student can enter upon his work until after such payment. For the rules governing the refunding of fees and the fees for the second semester, see page 117.

MATRICULATION FEES.—For Michigan students, *ten dollars,* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *ninety-five dollars* for men, *ninety-one dollars* for women; for all others, *one hundred twenty dollars* for men, *one hundred sixteen dollars* for women.

GRADUATION FEE.—For all alike, *ten dollars.*

LABORATORY EXPENSES.—No laboratory fees are charged. In the laboratory of chemistry a deposit is required to cover the cost of material and unusual breakage. The expense varies with the prudence and economy of the student, the average amount being about five dollars. Where the laboratory deposit is indicated as $10 it should be understood that the cost of non-returnable articles is slightly over five dollars and that a refund will be granted each student at the end of the course.

For additional information in regard to fees and expenses, see page 115.

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Homœopathic Medical School*

A special Announcement giving further details in regard to this School is published annually. For copies of this Announcement, or for other information relating to the School, address Dr. W. B. Hinsdale, Dean, Ann Arbor, Michigan.

The Homœopathic Medical School, established in 1875, offers the superior advantages that accrue to all parts of a University system. The entrance requirements insure a competent group of students, the courses are thorough, college life is passed among the students and faculties engaged in all fields of culture and in technical and professional training. The School has commodious buildings situated upon University grounds within one minute's walk of the center of the campus.

For the first two years the major part of the student's work is done in the large medical building which contains lecture rooms and laboratories particularly, adapted to the teaching of the subjects of Anatomy, Physiology, Pathology, Histology, Bacteriology, and Medical Chemistry; the balance of the instruction, which is almost entirely clinical, is given in the hospital entirely under the management of the Homœopathic staff. The Homœopathic Hospital is one of the finest and best equipped structures connected with the University. Aside from the main hospital building, to which an annex accommodating eighty children has recently been added, there is an Administration building for the accommodation of the offices of the Dean, Secretary, and Clinical Record Keeper, and the Laboratory of Internal Medicine, a Maternity Home, a General Clinical Laboratory, Nurses' Home, Tuberculosis shacks, etc., all grouped within a radius of three hundred yards.

The instruction in the School is based upon the theory that the Homœopathic principle in therapeutics is scientific and capable of safe and universal application to all classes of patients whether their invalidism arises from infection, accident, follows surgical operations, or is "constitutional."

The academic year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922.

* Formerly known as the Homœopathic Medical School.

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REQUIREMENTS FOR ADMISSION

Every applicant for admission to the Homœopathic Medical School must be at least seventeen years of age, and must present to the Faculty satisfactory evidence of good moral character.

Women are admitted, as to all other schools and colleges of the University, on the same conditions as men.

To obtain a degree in medicine in the shortest possible time a student should make the proper selection of studies while in high school.

One difficulty experienced by students who are even college graduates is that their subjects have not been properly selected.

Two years of collegiate study after completing the course of an accredited high school are required for admission to this Medical School. The preliminary years may be taken in the College of Literature, Science, and the Arts of this University or in another university or college of acceptable rank. The secondary school work must include two units of Latin, and should also include Physics and Chemistry. It is advisable that Botany, Zoölogy, and either French or German should also be included. The two years of collegiate work must include two years of French or German (or one year in addition to two years of the same language in high school), one year of Physics, one of Botany and Zoölogy, and two years of Chemistry (or one and one-half in addition to one in high school). The courses in science must include laboratory work. The collegiate work must amount to sixty semester hours of graduation average.

Credits

Credits not earned in this University may come from any college or university, of like standing, and should include full work in each of the sciences, Biology, Chemistry and Physics. A reading knowledge of German or French is very desirable. The following scheme will serve as a guide:

I. Chemistry: General, Qualitative, and Organic. The first two must be and the third should be with thorough laboratory drill.
II. College Physics, with laboratory.
III. General Biology, including both Zoölogy and Botany, with laboratory.
IV. Rhetoric and English Composition.
V. German or French, preferably German.

In all laboratory courses, a well-kept note book is required.

While Chemistry, Physics, and Biology are required, and the languages recommended in the order given, students may, especially if already proficient in a part of the list, select some subjects not mentioned. It is advised that those who take the years of collegiate

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studies outside this University, communicate with the Dean of the College of Literature, Science, and the Arts, who will be pleased to make suggestions that may be deserving of consideration. Blanks will be furnished upon application, to all who wish to submit for review and evaluation an outline of their preparatory studies.

Further Particulars

For the purpose of having credits reviewed, for advice as to pre-medical courses, and for special consideration of individual, peculiar, or irregular cases, as soon as one seriously contemplates studying medicine in this school he is advised to communicate with the Dean.

On arriving in Ann Arbor, students should apply at the office of the Dean or Secretary of this School. These offices will be open daily during the latter part of September, and some one who can give information will be in attendance. An inquiry addressed to either the Dean or the Secretary of the Homœopathic Medical School of the University of Michigan will receive prompt and cordial attention.

ADMISSION TO ADVANCED STANDING

Persons who have studied medicine elsewhere may be admitted to advance standing upon evidence of proficiency in the studies which have been pursued already by the class to which they seek admission, provided their credentials for admission to medical college were of equal grade with those of this college at the time when they first registered in medicine, and that the institution from which they come is of approved standing.

The rank of the college from which the credentials are presented will be taken into consideration as well as the letters of honorable dismissal. The rule has been adopted that students are not received who have conditions standing against them in the college from which they come.

STATEMENT TO STUDENTS CONTEMPLATING THE STUDY OF MEDICINE

Although the time for qualifying as a physician after leaving high school is longer and the expense correspondingly greater than formerly, the time and money is well spent. There never has been a time in the history of this school, when its graduates were so much in demand and when positions in hospitals, laboratories and public service were so numerous and inviting. Besides there are locations for lucrative general and special practice always awaiting such physicians as the Faculty can recommend. Correspondence upon this subject is invited by the Dean.

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COMBINED CURRICULA IN LETTERS AND MEDICINE

A.B. AND M.D.

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and of Doctor of Medicine in the Homœopathic Medical School, may, by enrolling on the Combined Curriculum in Letters and Medicine, shorten from eight years to seven the time required to earn the two degrees. This privilege is open only to students who throughout their course maintain a uniform record of good scholarship. The work is under the direction of a Committee of five members representing the College of Literature, Science, and Arts, and the Homœopathic Medical School. With the consent of the Committee in charge, a candidate for the degree of Bachelor of Arts, who has been a student in the College of Literature, Science, and Arts, for at least one year, and has 90 or more hours to his credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll upon the combined curriculum; that is, while continuing his registration in this College he may register in the Homœopathic Medical School, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete within one year the specific requirements described in the following paragraphs.

Students desiring to enter upon the Combined Curriculum in Letters and Medicine must, before May 15 of the year of residence preceding the double registration, file with the Registrar of the College of Literature, Science, and the Arts formal application made out upon a proper blank obtained from that office.

When the student so registered in the college and school has completed the first year of the medical curriculum, and not less than 90 hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has completed the requirements for graduation from the latter college (see page 138) and provided his work has included the following courses:

Rhetoric, 6 hours, including Courses 1 and 2.
French and German, 16 hours of either one, and 8 hours of the other.
English, 6 hours.
Psychology, 6 hours.
Electives from Group III, 12 hours, unless excused in part by the Committee.
Physics, 8 hours, including two hours of laboratory work. Plane trigonometry and a unit of preparatory physics are prerequisite for this work.

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Chemistry, general, qualitative, and organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours
Botany, 4 hours.
Zoölogy, 10 hours.
Total, 90 hours.

Suggested electives: Latin or Elementary Greek, 8 hours; History, or Economics, or Philosophy, 8 hours; Qualitative Analysis, 4 hours; Organic Chemistry, 5 hours.

B.S. (IN MED.) AND M.D.

Students who so desire, may obtain the degree of Bachelor of Science, in Medicine and Doctor of Medicine in six calendar years by complying with the requirements above set forth, except that they must complete the first and second years of the medical curriculum and that the credit required from the College of Literature, Science, and the Arts, instead of 90 hours, shall be 67 hours before they enroll upon the combined curriculum, and 75 hours before they receive the B.S. (in Med.) degree, and shall include the following courses:

Rhetoric, 6 hours, including Courses 1 and 2.
French or German, 16 hours of one.
Electives from Group III, 12 hours.
Physics, 8 hours, including two hours of laboratory work. Plane trigonometry and a unit of preparatory physics are prerequisite for this work.
Chemistry, general, qualitative, and organic, 12 hours for students presenting Chemistry for entrance, otherwise 16 hours.
Biology, 8 hours.
Total, 75 hours.
Electives are suggested from the courses before mentioned.

Students taking the six-year program will ordinarily need to attend the College of Literature, Science, and the Arts two and one-half years, or two years and two Summer Sessions. If their scholarship is sufficiently high, they may apply for permission to elect a limited number of extra hours.

CHARACTER OF INSTRUCTION

The university plan is to provide instruction in one college or school that may count for credits in another college or school, thereby avoiding the duplication of teachers and courses. Students studying six years receive much of their instruction in the College of Literature, Science, and the Arts, as previously indicated. Four-year students also receive their instruction in Chemistry in that college and their instruction in Medical Jurisprudence in the Law School. Much

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of the laboratory and preliminary scientific training is taken with the students in the Medical School. The subjects which are under the immediate charge of members of the faculty of the Homœopathic Medical School are here outlined.

Materia Medica and Therapeutics

Materia medica is taught as a natural science. Three lectures are given weekly, based as far as possible on studies of the original provings, paying special attention to the genius of each drug, its characteristics, and its relationship to other drugs. The physiological action of drugs, as ordinarily understood, is duly considered.

Systematic instruction in the principles and philosophy of Homœopathy is a natural feature. The course is given to the whole body of students, beginners as well as the more advanced, in order to fix in their minds the underlying principles of the science of homœopathic practice.

A thorough laboratory course in drug proving is a special feature of this School. Students are required to do a certain amount of original work in drug pathogenesy under the supervision of the Director of the Pathogenic Laboratory.

Principles of Medicine

The principles of medicine are taught in a separate course setting forth the scientific explanation of disease and the principles upon which a system of cure must be constructed. Attention is given to historic medicine and the various systems that have been in vogue as a means of attempted cure. In the medical clinic the idea is never lost sight of that the function of the physician is to cure the sick, and that to accomplish this end accurate prescribing is of the highest importance.

Theory and Practice

The instruction in theory and practice is didactic and clinic. The subject is divided into separate courses covering all the ground, both general and special, with which a physician in general practice must be familiar. In this connection a special course in diseases peculiar to childhood, and in the feeding of infants and invalids, is given. The aim is to make the student, by applying his knowledge of pathology, a good diagnostician, and by his knowledge of materia medica, a good prescriber. In the clinics especial attention is given to dietetics and similar means of treatment.

Pediatrics

Especial attention is given to Diseases of Children as an independent branch. Lectures are given upon the diseases incident to the extremes of life in which the susceptibilities of nurslings and grow-

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ing children are taught separately. The contagious and infectious diseases peculiar to childhood are considered in the lectures upon Infectious Diseases. A special course upon the Management of Children is given in the Training School for Nurses; the medical students are required to attend certain ones of these lectures. The important subject of Infant Feeding is referred to under *Dietetics*. An annex accommodating eighty children, complete within itself, connected with the main hospital building by a wide passageway, has been completed and is now occupied.

Medical and Physical Diagnosis

Diagnosis is taught as a separate branch. The subject occupies one hour a week throughout two entire years.

In addition to regular class-room work and recitations, the students are divided into sections and examine the patients in the hospital, under the direction of the instructor in charge. Diagnosis clinics, in which all diagnostic means are employed are held regularly.

General Surgery

The work in surgery follows the following outline:

1. A course of lectures to students in the second year upon minor surgery and bandaging,

2. A course upon the principles of surgery.

3. A complete course upon operative surgery, features, and dislocations.

4. An examination and diagnosis clinic is held twice a week for the senior and junior classes. All patients presenting themselves for surgical treatment are examined and a clinical diagnosis made, which is checked up by the subsequent operative and pathological findings.

5. Operations upon the cadaver; a sufficient number of subjects is provided by the authorities without expense to the class. Each candidate for graduation is required to demonstrate his knowledge of operative surgery in this practical manner.

Students are assigned cases to diagnose and to present to the class. Under proper direction they are required to make the necessary preparations for operations and to assist when assistance is necessary. Advanced students, under the immediate supervision of the surgeon or his assistant, treat patients upon whom operations have been made.

Gynecology

Gynecology is taught in three courses:—

1. Minor gynecology, dealing with the methods of diagnosis, the use of instruments used in operations, and the technique of operations themselves.

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2. Major gynecology, dealing with the graver aspects of the subjects such as adventitious growth, extensive injuries, methods of making gynecological examinations, and the medical and operative treatment indicated.

3. Clinical instruction. The hospital furnishes a superabundance of cases in all kinds of diseases peculiar to women. Each week several major and many more minor operations are performed. The students in this clinic, the same as in general surgery, prepare patients for operations, assist at the operating table, give anæsthetics, and have the after-care of cases and do the necessary surgical dressings, under the direction of the professor himself or of his assistant.

Obstetrics

Students are taught the physiology of gestation, the pathological conditions that may be encountered in that period and in the puerperium, the principles of cleanliness, the mechanics of parturition and the manipulation of instruments. In the sub-clinics they familiarize themselves with the various methods of practicing "touch" palpitation, obstetric auscultation, etc.

Cases in obstetrics are assigned to each senior for his especial delivery and personal attendance. The many patients that come to the Maternity Home from various parts of the state are utilized to the best possible advantage.

Ophthalmology

Regular lectures on this important specialty, amply illustrated from the abundance of clinical material at the disposal of the Faculty, are given in the fourth year. The eye clinic forms one of the most interesting features of the clinical work, and affords the class every facility for a thorough, practical study of all diseases of the eye that come under the observation of the physician. Students have cases assigned them for dressing and treatment, and thus acquire skill and knowledge in diagnosis, and in the use of the various instruments. A special course is given in the correction of errors of refraction.

Otology, Rhinology, and Laryngology

The basis of the instruction, as in other departments will be material that has always been sufficient, afforded by the in and outpatient departments of the hospital. There are, at every clinic, from twenty to thirty patients awaiting medical, topical, or surgical treatments of diseases of the ear, nose, and throat. The students are required to make instrumental as well as other examinations, to make diagnoses, and to indicate the lines of treatment under the supervision of the professor. Regular courses of lectures upon these subjects are given to third and fourth year students.

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Mental and Nervous Diseases

In the department of diseases of the nervous system weekly clinics are held. Practical courses are given upon the various phases of the mentally defective and the insane. There is an abundance of clinical material to demonstrate all the more frequent forms of nervous diseases as well as many of the rarer ones.

Dermatology

The courses in Dermatology consists of lectures, quizzes, and a weekly clinic which is well supplied with material. Photographic, lithographic, and stereopticon plates are used in the differential demonstrations.

The department is well equipped with the latest Roentgen Ray and other electrical appliances, and practical instruction is given in their general and special adaptability to the treatment of malignant diseases of the skin.

Genito-Urinary Diseases

The instruction includes two distinct courses:

1. A quiz and demonstration course, with weekly recitations.

2. A clinic which is made up of the cases in the hospital requiring either medical or operative treatment. This clinic is quite distinct from any of the other surgical or medical departments, and is given by the professor who also teaches Dermatology, a subject many times involving genito-urinary problems.

Toxicology

The class is given a practical knowledge of the different poisons and their antidote. Especial attention is given to the physiological action of drugs and chemicals. The relation existing between drug action in producing abnormal conditions and diseases as they arise from natural or idiopathic cause is constantly kept before the student. This is a new course and a very important one. It really includes very much more than the subject of poisons and antidotes. Whenever a medico-legal opinion is pertinent, it is presented. Illustrations of a practical nature are introduced and experiments on animals employed.

Pharmacy and Pharmacology

These subjects are largely covered in the departments of Materia Medica, Toxicology, and in the pathogenetic laboratory. Special instruction is also given upon the origin, preparation, and administration of remedies.

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Drug Proving

A practical laboratory in Pathogenetics has been instituted in the hospital, with a special director in charge. Volunteer students, accepted with reference to their physical merit, are put through severe tests under constant observation of the Director. A diet-table is provided for the provers, free of cost to themselves, that entire control may be had over them while they are testing drugs. As a result of the work done in this laboratory the School has been able to publish a number of instructive, original reports.

Dietetics

A course is given in which the problems of food in relation to health and disease are discussed. The feeding of invalids and infants is given special attention. In the clinics, whenever the question of the effects of diet, the preparation of foods and drinks, and their proper administration can be profitably considered, the most is made of the opportunity. There is in the hospital a diet kitchen, in charge of a scientific dietitian in which the special diet lists are prepared and from which they are served. The senior students in charge of cases, under proper supervision are required to make out orders for the feeding of their patients and to observe the preparation of the food.

Electro-therapeutics

This department receives the prominence that so important a branch of therapeutics deserves.

The aim is to teach theoretically and practically the subject of electricity as it will be employed in the office of the physician in general practice. The use of the X-ray is also included in this department.

The hospital is equipped with much new and special apparatus, which, beside being in constant service is used in a thorough course of instruction, with clinical applications, for the fourth year students.

Demonstration Courses in the Specialties

Before graduation each student is required to do actual work in demonstrating his medical and surgical skill. By operating upon the cadaver and upon animals; by manipulation of manikins and models; by actual dressing of wounds, and bandaging; by thorough drill in the practical use of the opthalmoscope, the laryngoscope, the test case, and in the fitting of glasses; by the use of the microscope and the spectroscope; by the making of tinctures and dilutions; by bedside demonstrations and examinations; by actual prescribing; by these methods of the students become practical and are prepared to make successful physicians. The classes are divided into sections, and each

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individual has his share of actual work. For these demonstration courses there is no extra expense. Students assist at operations and take turns in ward visiting. They are also required to take, and arrange in writing the histories and to keep the records of patients that are assigned to them in rotation.

These histories are read in the classes, reviewed and corrected by the clinician, and preserved as permanent records of the hospital.

DESCRIPTION OF COURSES

The following summary shows the arrangement of the instruction in the subjects named for the several years and semesters. This order is subject to change, as adjustment of courses and lectures can not always be made to conform to an invariable schedule.

MATERIA MEDICA

1. Materia Medica. Lectures and recitations. Three times a week. Third and fourth years. Professor DEWEY.

2. Therapeutic Principles. Lectures and recitations. Once a week for a semester. First and second years. Professor DEWEY.

3. See Theory and Practice. Courses 4 and 6.

THEORY OF PRACTICE AND DIAGNOSIS

1. Treatment. Lectures and recitations. Once a week. Professor HINSDALE.

2. Medical Diagnosis. Recitations and demonstrations. Twice a week. Second and third years. Assistant Professors BOERICKE and BOYD.

3. Practice. Lectures and quizzes. Once a week. Third and fourth year. Assistant Professor BOERICKE.

4. Treatment. Lectures and quizzes. Once a week. Fourth year. Professor HINSDALE.

5. General Medicine. Clinical Courses. Two consecutive hours. Daily. Third and fourth years. Professor HINSDALE, and Assistant Professors BOERICKE and BOYD.

6. Bedside Studies, Laboratory Diagnosis and Prescribing. Every day from 8 to 9 a. m. Fourth year students in parties of two. Professor HINSDALE and Staff.

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MENTAL AND NERVOUS DISEASES

1. Lectures. Once a week. Third and fourth years. Professor DEWEY.

2. Clinics. Once a week. Assistant Professor BOYD.

SURGERY

1. Fractures and Principles of Surgery. Twice a week. Two hours. Second year. Professor BEEBE.

2. Lectures in General Surgery. Twice a week. Two hours. Third year. Dr. CLOSZ.

3. Lectures in General Surgery. Twice a week. Third and fourth years. Professor BEEBE.

4. Surgical Diagnosis. Twice a week. Third and fourth years. Professor BEEBE.
   Out patients at same hours. Dr. CLOSZ.

5. Surgical Operative Clinic. Three times a week. Third and fourth years. Professor BEEBE and Dr. CLOSZ.

6. Genito-Urinary and Cystoscopic Examination Clinic. Twice a week. Third and fourth years. Professor BEEBE and Dr. CLOSZ.

7. Genito-Urinary Operative Clinic. Once a week. Third and fourth years. Professor BEEBE and Dr. CLOSZ.

GYNECOLOGY AND OBSTETRICS

1. Major Gynecology. Lectures and recitations. Twice a week. Third and fourth years.. Professor RUNNELS.

2. Minor Gynecology. Lectures and recitations. Once a week. Third year. Dr. JOHNSON.

3. Obstetrics. Lectures and recitations. Three times a week. Third and fourth years. Professor RUNNELS.

4. Gynecological Clinic. Four times a week. Third and fourth years. Professor RUNNELS and Dr. JOHNSON.

PEDIATRICS

1. Lectures and Clinics. Twice a week. Third and fourth years. Assistant Professor BOERICKE.

2. Out-patient Clinic. Daily. Assistant Professor BOERICKE.

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OPHTHALMOLOGY

1. Recitations. Twice a week. Third year. Second semester. Dr. WYNN.

2. Advanced Work. Lectures and quizzes. Twice a week. Fourth year. First semester. Professor MYERS.

3. Refractions. Class in sections. Fourth year. One hour, twice a week. Professor MYERS.

4. Clinic. General and Operative. One hour. Five times a week. Professor MYERS and Staff.

OTO-LARYNGOLOGY

1. Recitations. Twice a week. Second year. Second semester. Dr. WYNN.

2. Recitations. Twice a week. Third year. First semester. Professor MYERS.

3. Lectures and Quizzes. Fourth year. Twice a week. Second semester. Professor MYERS.

4. Clinic: General and Operative. One hour. Five times a week. Professor MYERS and Staff.

DERMATOLOGY

1. Lectures and Recitations. One hour a week. Third year. Both semesters. Assistant Professor BOERICKE.

2. Clinic. Two hours a week. Third and fourth years. Both semesters. Assistant Professor BOERICKE.

GENITO-URINARY DISEASES

1. Lectures and Recitations. One hour a week. Third year. Both semesters. Assistant Professor BOYD.

2. Clinic: General and Operative. Two hours a week. Third and fourth years. Both semesters. Surgical Staff.

ELECTRO-THERAPEUTICS AND RADIOGRAPHY

Clinic. Ten hours a week. Both semesters. Dr. DURLING.

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SPECIAL PATHOLOGY

Laboratory Examinations and Analysis. Class in sections. One hour. Fourth year. Dr. HANNA, Miss BUCKLEY, and Mr. MACKINNON.

HOSPITAL LABORATORY

Every morning. Specimens from hospital clinics. Class in sections. One hour. Dr. HANNA, Miss BUCKLEY, and Mr. MACKINNON.

PHARMACY

Lectures and Recitations. Once a week. Second semester. Second year. Assistant Professor BOERICKE.

SUBJECTS PURSUED IN CONNECTION WITH CLASSES IN OTHER SCHOOLS OF COLLEGES OF THE UNIVERSITY.

Anatomy, Bacteriology; Botany; Chemistry (General, Qualitative, Organic, and Physiological); Embryology; Histology; Hygiene; Medical Jurisprudence; Organic Evolution; Osteology; Physics; Physiology; Zoölogy. The instruction in these subjects is given in connection with classes in the Medical School, the College of Literature, Science, and the Arts, and the Law School. The nature, extent, and arrangement of these courses may be seen by reference to other pages of this Catalogue.

EXAMINATIONS

At the end of each semester examinations (written, oral, or both written and oral) are held on all subjects taught during the semester, and each student's grade is entered upon the records of the Faculty in accordance with the following system of marks: A, excellent; B, good; C, fair; D, deficient; E, not passed. Students *"conditioned"* (D grade) cannot apply for another examination in the same subject until the close of the next course or semester, except that a student conditioned at the close of the college year may ask for another examination in the first two weeks of the following year. Students reported *"not passed"* (E grade) are required to take the course over again before applying for another examination.

REQUIREMENTS FOR GRADUATION

To receive the degree of Doctor of Medicine, a student must be twenty-one years of age and possess a good moral character. He must have completed the required courses in laboratory work, and have passed satisfactorily examinations on all the required studies

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included in the full course of instruction. He must have been engaged in the study of medicine for the period of four years, the last of which must have been in this school.

COURSES FOR PRACTITIONERS

Medical science has made such rapid progress during recent years that graduates of a short time ago feel the necessity of returning to medical centers for supplementary study. The laboratories and special courses of this School offer superior advantages to graduates.

The nature of the work arranged for graduate students in hygiene, bacteriology, pathology, physiology, histology, physiological chemistry, and anatomy, may be learned by reference to pages 469 to 477.

In practical branches, such as materia medica, physical diagnosis, surgery, ophthalmology, otology, laryngology, obstetrics, gynecology, dermatology, electro-therapeutics, and genito-urinary diseases, graduate instruction may be had, by special arrangement with the professors in charge, in connection with the demonstration courses given in the last two years.

OTHER FACILITIES FOR INSTRUCTION

Museums and Laboratories

The museums of anatomy and materia medica, comprising thousands of specimens, models, and charts, afford the best means attainable for the close study of anatomy, physiology, pathology, and pharmaceutics. The general and special cabinets of the University, containing about 255,000 specimens, are also open freely to all students. (Compare pages 63 to 66). The facilities for the study of chemistry, afforded by the chemical laboratory, are not excelled in any medical college in this country, and the arrangements for the laboratory work are such that medical students, in classes, and working under the direction of the professors in charge, receive practical instruction in the courses in qualitative chemistry, and the analysis of fluids and secretions of the body, a knowledge of which has become absolutely indispensable to the successful physician. The histological laboratory, amply supplied with microscopes, sphygmographs, stereopticon, etc., offers rare facilities for the prosecution of practical work in experimental physiology and histology. The hygiene and anatomical laboratories are models of convenience, affording facilities for instruction in hygiene and in practical anatomy unsurpassed by those of any other institution of learning in the United States. For a fuller description of the laboratories of the University used by homœopathic students in common with students of other schools and colleges, see pages 68 to 75 and pages 481 to 485.

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Pathogenetic Laboratory

A laboratory of experimental pathogenesy, in one of the Homœopathic buildings is equipped with the necessary apparatus for experimentation with medical substances on the healthy human body, a special feature of this college. Provings are made, and each student is required to do a certain amount of original work and research in the pathogenic field. A complete course in homœopathic pharmaceutics is also given in this laboratory.

Libraries

The General Library of the University (see page 59), is open to the free use of students. Important additions have recently been made to the collection of works on Homœopathy. A large number of publications, domestic and foreign, are received regularly and kept on file in the library reading room.

Other Facilities

Students in the school have the privilege of attending the scientific and philosophical lectures, collateral to medicine, given in the College of Literature, Science, and the Arts. For a description of the gymnasiums, and the conditions on which they are open to students, see page 79.

THE UNIVERSITY HOMOEOPATHIC HOSPITAL

The University Homœopathic Hospital stands a little to the northeast of the University campus. It has a frontage of two hundred feet, and the ground plan resembles, in general, the letter T. Each end of the top line of the letter represents a ward, and the base is occupied by the operating and clinic rooms. The building extends back over the brow of a hill, and a rear view shows five stories in the clear. The general wards are planned each for sixteen beds. Sun parlors, one in front of each ward, are available as sitting-rooms for patients able to leave their beds. The plumbing is elaborate and of thorough construction. The building is heated by steam, and the ventilating system is guaranteed to change the air in the entire building every five minutes.

There are separate buildings for children and for obstetrical patients. The facilities for treating obstetrical cases have been largely increased. During the past year each senior student attended several cases of confinement.

The hospital is furnished with electrical appliances, and under direction, skilled attendants apply electrical treatment. The junior and senior students receive special instruction in this subject.

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Medical, surgical, gynecological, neurological, and ophthalmological clinics are held daily in the spacious amphitheater. Examinations of patients are made by the professors in charge, and by students under the direction of professors and assistants; prescriptions are given; and surgical operations are performed, in the presence of the class. The several clinics are held on separate days, of which the profession throughout the state will be notified at the opening of the University year.

Much attention is paid to physical diagnosis, and the abundance of clinical material furnishes many interesting cases. Students are required to take the history of patients, and, under proper supervision, make personal examinations and prescribe remedies. It is the aim of the Faculty to make clinical instruction systematic and thorough.

The hospital is kept open for patients during the college year, and also during the summer vacation. The expenses to patients are only for their board, for unusual appliances or special nursing, and for medicines, the services of the faculty being rendered gratuitously to those made available for clinical instruction.

Patients who desire to enter the hospital are requested to write to the Medical Superintendent to ascertain if there is room for their accommodation, and to obtain a circular giving more fully the rules governing admission.

Welfare Staff

The Children's Welfare Staff is under the management of Mrs. Elmie Warner Mallory, Ph.B., a woman of wide practical and technical experience, having occupied the position of women's dean in two educational institutions. She is a specialist in social and juvenile problems. The personnel of the staff, in part, is an information secretary, maternity and pediatric nurses, kindergarten principal and teachers. The department of Education of the College of Literature, Science, and the Arts of the University, upon request, will supervise the teaching in the hospital school thereby insuring expert direction.

TRAINING SCHOOL FOR NURSES

In connection with the Hospital there are two nurses' homes, and a training school under the charge of a competent and experienced principal. For admission is required the completion of a full four-year course in a standard high school. The term of study and service extends through three years of forty-eight weeks each, at the expiration of which time those who have proved competent and trustworthy are granted certificates of graduation. For further information in regard to this school, application may be made to Miss EDNA M. CRANDELL, Principal, Ann Arbor, Michigan.

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RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities see page 110.

FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no student can select his seat until after such payment. For the rules governing Second Semester fees and the refunding of fees see page 117.

MATRICULATION FEE.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *two hundred dollars* for men, *one hundred ninety-six dollars* for women. This annual fee covers the laboratory and demonstration course fees, formerly charged separately.

GRADUATION FEE.—For all alike, *ten dollars.*

SUMMARY.—The total amount of fees paid to the University during the whole four years' curriculum in medicine, including fees for matriculation and graduation is, for Michigan students, about $580, and, for others, about $730.

For additional information in regard to expenses see page 115.

Students arriving in Ann Arbor, and desiring further information, should apply at the office of the Dean. The office will be open daily during the latter part of September. Members of the Faculty, or other persons competent to give information will be in attendance.

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College of Dental Surgery

A special Announcement giving further information in regard to this College is published annually. For copies of this Announcement, or for other information relating to the College, address, The College of Dental Surgery, Ann Arbor, Michigan.

The College of Dental Surgery was established as a Department of the University in 1875. The college year extends from Tuesday, September 27, 1921, to Monday, June 19, 1922. Lectures close about June 16 in order to allow for the final examinations before Commencement.

Four years of study are required for the dental degree.

This College is on the approved list of reputable colleges of the National Board of Examiners, which insures the standing of its graduates before all State Examining Boards. The College is also a member of the Dental Faculties Association of American Universities, which maintain the highest standards known in dental education.

The requirements for admission to the College of Literature, Science, and the Arts are stated on page 120.

REQUIREMENTS FOR ADMISSION

SEPTEMBER, 1921, AND THEREAFTER.

Beginning with the session of 1921-1922, the requirements for admission are one year of collegiate work (30 semester hours), which may be pursued in the College of Literature, Science, and the Arts of this University, or in any college which is on its accredited list. The work must be as follows: General Chemistry, 4 hours; Qualitative Chemistry, 4 hours; Zoology, 4 hours; Botany, 4 hours; English, 6 hours; electives, 8 hours. The electives should be made up from the following subjects: Language, botany, mathematics, shop practice, history, geology.

SEPTEMBER, 1920, AND THERETOFORE.

The requirements for men and women are the same. An applicant for admission to the College of Dental Surgery must be at least 17 years of age and must present a certificate of graduation and recommendation from an accredited high school, or an equivalent;

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which equivalent is interpreted to mean 15 units,—nine of which are in required subjects and six elective,—of preparatory work in a recognized college, academy, State normal school, or like institution.

In lieu of a certificate of graduation or an equivalent, admission may be obtained by examination in the College of Literature, Science, and the Arts of the University of Michigan, on the subjects outlined below, providing a grade satisfactory to the Faculty of this College is earned in each subject.

Students from foreign countries will be accepted for enrollment upon presentation of a matriculation certificate issued by the standard matriculation body in the country from which they come, provided such certificate covers the subjects specified below.

All entrance credentials will be valued on the unit basis, a unit meaning a study pursued for a year with five recitations each week, of not less than 45 minutes duration.

The fifteen units required for admission must include at least three units in English, two units in Mathematics (elementary algebra and plane geometry), one unit in Physics, one unit in Chemistry, and two units in Latin.* The other six units may be selected by the applicant from the following list. The scope of the preparatory work is described on pages 123 to 131.

The subjects from which choice may be made, and the number of units which will be accepted in each subject are as follows:

English Composition, 3 units.	Trigonometry, ½ unit.
English Literature, 1 unit.	Physics, 1 unit.
Latin, 2, 3, or 4 units.	Chemistry, 1 unit.
French, 2, 3, or 4 units.	Botany, ½ or 1 unit.
German, 2, 3, or 4 units.	Zoölogy, ½ or 1 unit.
History, 1, 2, or 3 units.	Physiography, ½ or 1 unit.
Algebra, 1, 1½, or 2 units.	Drawing, ½ unit.
Geometry, 1 or 1½ units.	Manual Training, 1 unit.

In compliance with a rule of the National Association of Dental Examiners, no student can be given credit for a full course of instruction in this college who does not matriculate on or before the tenth day after the annual session begins.

COMBINED CURRICULUM IN LETTERS AND DENTAL SURGERY

Students desiring to obtain the degrees of Bachelor of Arts in the College of Literature, Science, and the Arts, and of Doctor of Dental Surgery in the College of Dental Surgery, may, by enroll-

* One year's work in German or French may be substituted for the second year in Latin.

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ing on the Combined Curriculum in Letters and Dental Surgery, shorten from eight years to seven the time required to earn the two degrees. This privilege is open only to students who throughout their course maintain a uniform record of good scholarship. The work is under the direction of a Committee of five members, representing the College of Literature, Science, and the Arts, and the College of Dental Surgery. With the consent of the Committee in charge, a candidate for the degree of Bachelor of Arts, who has been a student in the College of Literature, Science, and the Arts for at least one year, and has 90 or more hours to his credit, of which at least 30 hours have been earned in the College of Literature, Science, and the Arts of this University, may enroll upon the combined curriculum; that is, while continuing his registration in this College he may also register in the College of Dental Surgery, provided the work he has already completed includes a sufficient number of the courses enumerated below to enable him to complete with one year the specific requirements described in the following paragraph.

Students who desire to enter upon the Combined Curriculum must in May of the year preceding double registration, file with the Registrar, on a blank to be obtained from him, a petition to be granted that privilege.

When the student so registered in the two Colleges has completed the first year of the dental curriculum and not less than 90 hours in the College of Literature, Science, and the Arts, he will be recommended for the degree of Bachelor of Arts, provided he has satisfied the requirements for graduation from the latter College, (see page 138), and provided his work has included the following courses:

Rhetoric, 6 hours, including Courses 1 and 2.

French and German, 16 hours of either one, and 8 hours of the other.

Physics, 12 hours, including 4 hours of laboratory work.

Chemistry, general, qualitative, and organic, 14 hours for students presenting Chemistry for entrance, otherwise 18 hours.

Botany, 4 hours.

Zoölogy, 10 hours.

English, 6 hours.

History, 8 hours.

Total, 84 or 88 hours.

Suggested electives: Latin or Greek, 8 hours; Philosophy, 3 hours; Physical Chemistry, 3 hours.

The foregoing curriculum will undergo modification on account of the lengthening of the Dental Curriculum to four years.

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ADMISSION TO ADVANCED STANDING

Persons having *qualifications for admission* to this College, and having studied dentistry in other colleges for at least one year, may be admitted to advanced standing after satisfying the Faculty that they have completed an amount of work equivalent to that which has been done by the class in which they seek admission.

Students having had one or more years in a reputable medical college or a college of Literature, Science, and the Arts, are allowed credit toward graduation for as much of the required course in dentistry as was included in their course.

COURSES OF INSTRUCTION

The curriculum covers four college years of nine months each and one summer session of eight weeks. The first year is occupied with the study of fundamental and preparatory subjects which lead the way to a clearer conception of the strictly dental problems. In view of the recognized importance of dentistry and dental operations to the general health, and its relation to general medical practice, dentistry must be taught in its relation to general medicine. There has been included in the curriculum therefore, as much underlying ancillary and medical education as is possible to give in the preparation for the special dental subjects.

SCHEDULE OF STUDIES*

First Year

FIRST SEMESTER	Class	Lab.	SECOND SEMESTER	Class	Lab.
Inorganic Chemistry	85	119	English II	51	
Biology	34	102	Histology	85	140
English I	51		General Anatomy		280
Technical Drawing		68			
	170	289		136	420

Summer Session

Physics	128	64			

Second Year

Qualitative Chemistry	34	153	Dental Anatomy and Prosthetic Technics	34	493
Bacteriology		160	Organic Chemistry	68	
Dental Anatomy and Prosthetic Technics	34	350	Physiology	85	
			Dental Histology	34	
			Comparative Dental Anatomy	34	
	68	663		255	493

* The columns of figures show the total number of hours required for each course of study.

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		Third Year			
General Pathology	68	160	Dental Pathology	34	68
Materia Medica	34		Crown and Bridge	17	
Oral Hygiene	17		Oral Surgery II	34	
Prosthodontia	68		Therapeutics	34	
Operative Technics		265	Metallurgy	17	
Physiological Chemistry and Hygiene	68	17	Surgical Anatomy	17	
			Clinics		510
	255	442		153	578
		Fourth Year			
Oral Surgery I	17		Oral Surgery I	17	
Oral Surgery II	34	17	Oral Surgery II	34	17
Clinical Pathology	17		Metallurgy	17	
Dental Therapeutics	17		Dental Therapeutics	17	
Crown and Bridge	34		History and Ethics	34	
Orthodontia	34		Operative Dentistry	17	
Metallurgy	17		Clinic	17	510
Operative Dentistry	17				
Clinic	17	510			
	240	527		153	527

DESCRIPTION OF COURSES

English and Drawing

The instruction in the subjects of English and Drawing is given in the Colleges of Engineering and Architecture. Instruction in these subjects given in other colleges or universities and accepted for credit by the College of Engineering and Architecture as the equivalent of that given in this University will be accepted for advance standing by the College of Dental Surgery.

Physics, Zoology, and Chemistry

These subjects are given in the several departments of Physics, Zoölogy, and Chemistry of the University. They are taught in the laboratories and under the personal direction of the teachers of the respective departments.

Anatomy, Embryology, Histology, Physiology, Bacteriology, and Pathology

These subjects are given in the Medical School. They are taught in the form of lectures and laboratory instruction by members of the medical faculty. Especial attention, however, is given in Anatomy and Histology to the head and neck region. All other tissues and

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organs of the body are studied somewhat less intensively. These two courses are supplemented by instruction in the Dental College upon comparative dental anatomy and dental histology. The Odontological Museum, the gift of the late Professor Ford, which has been greatly increased by a contribution from Dr. William Mitchell of London, England, offers exceptional opportunities for this work.

Materia Medica and Therapeutics

In dental materia medica and therapeutics a special course of lectures embraces the history, pharmacy, pharmacology, and therapeutics of all drugs and remedies used in the treatment of diseases occurring in dental practice. The course also includes a discussion of pain obtundents, local and general anæsthetics, prophylactic remedies, and instruction in roentgenology.

Dental Oral Surgery

Two courses of lectures on clinical dental and oral surgery embrace a consideration of diseases of the teeth and mouth and associated parts that are of special interest to the dentist, as well as those that lie more within the province of the general surgeon for treatment. Illustrative cases are exhibited and discussed, and operations are performed before the class in the Dental and University Hospital clinics each week, and in the Dental clinic each afternoon.

Operative Dentistry

In operative dentistry the instruction is both didactic and practical. In the didactic course, which is preceded by a course in operative technics, a full presentation of approved methods, appliances, and materials used in filling teeth is given, together with the principles which form the basis of practice. This instruction is supplemented by practical instruction in the clinical operating room, which is under the personal supervision of the professors of operative and clinical dentistry and their assistants. Here each third and fourth-year student is required to spend twenty hours each week at the chair, operating for patients, and in this way verifying the principles taught and obtaining such manipulative training as will result in desirable preparation for skillful practice.

Prosthetic Dentistry

In prosthetic dentistry the instruction is both didactic and practical. In the lectures, the principles involved in the construction and application of artificial dentures, crowns and bridges, regulating devices, and continuous-gum and cleft palate work are fully discussed, and such methods as have proved valuable and worthy are advocated,

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In the practical department each student in the second and third years has opportunity and is required to construct and adapt to the mouth practical dentures for the restoration of lost dental organs.

The instruction in prosthetic technics embraces experimental construction of the various artificial dentures used to restore lost dental organs. It consists in taking impressions, making plaster models from impressions, making dies, swedging plates, and grinding and adjusting teeth, soldering and finishing, vulcanizing and finishing plates, pouring and finishing cast metal plates, and constructing various styles of crowns, bridges, and regulating devices, with such instruction as will familiarize the student with the most approved methods of doing such work.

EXAMINATIONS

At the end of each semester examinations are held on all subjects taught during the semester, and the results are recorded in terms of the following grades: *A*, excellent; *B*, good; *C*, fair or satisfactory; *D*, deficient: *E*, not passed. Students receiving a grade of *D* in any course must remove the conditions during the semester following the one in which it was received. No student who, at the end of a year, has failed to pass in two of the required subjects of his course is admitted to an advanced class during the first semester of the following year.

REQUIREMENTS FOR GRADUATION

The degree of Doctor of Dental Surgery is conferred upon those students in the College of Dental Surgery who have complied with the requirements for admission, possess a good moral character, have devoted four years to the study of dentistry, and have passed with satisfactory grades all the courses contained in the curriculum given on page 543.

Unless admitted to advanced standing, the candidate for this degree must have attended four full years in this College, and he is advised to attend them consecutively.

ELECTIVE STUDIES

By permission of the Faculty, students may avail themselves of numerous lectures in other departments, or elect studies in the College of Literature, Science, and the Arts; or may attend special lectures in the Medical School, on such subjects as are of importance to the practicing dentist, without extra fees, except where laboratory courses are taken.

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GRADUATE COURSES*

The Graduate School of the University of Michigan offers to graduates of the four year course in dentistry, the opportunity to do advanced work along certain specified lines in preparation for a degree of Master of Science. Only those graduates are admitted who have had sufficiently good records during their term of collegiate work to warrant the supposition that they could creditably carry the advanced studies. It is expected that all work done by a graduate student will be of a superior grade. Students whose work has been unsatisfactory will be requested to withdraw from the school.

A student may be recommended for the master's degree (M.S.) after one year of resident study in the Graduate School providing that the year has been spent in taking full work in studies of graduate grade. No student can acquire a right to such recommendation merely by a formal compliance with this rule.

After a student has been admitted to study for the master's degree, the teaching staffs of the departments concerned will outline such work as will be required for the master's degree. This outline must be approved by the Dean of the Graduate School and no student will receive the degree until this requirement has been fulfilled. Further information in regard to graduate work may be obtained by application to the Dean of the Graduate School, University of Michigan, and in the Announcement of the schedule and curriculum of that school which will be sent upon application.

SUMMER SESSION

The College of Dental Surgery offers during the Summer Session those parts of the regular curriculum in dentistry which are taught in the College of Literature, Science, and the Arts, and in the Medical School. (See the chapter on the Summer Session.)

One Summer Session is required immediately following the Freshman year, as shown in the schedule. Unless advanced credit is secured by the student in college physics, or other subjects included in the dental curriculum which is acceptable to the teachers of that subject, a summer session is necessary to graduation in four years.

All students desiring to pursue during the Summer Session courses which are to be recognized by this College, should first consult with the Dean of the College of Dental Surgery.

* See the chapter on the Graduate School.

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FACILITIES FOR INSTRUCTION

For general information relating to the University libraries, museums, laboratories, hospitals, and gymnasiums, see pages 59 to 84 and 481 to 485.

Among the facilities of special interest to students of dentistry the following may be mentioned:

THE DENTAL BUILDING

The Dental College is housed in a modern fireproof building 82 x 166 feet. It contains two large well lighted laboratories for instruction in prosthetic and operative technics, two operative clinic rooms, one amphitheater, one lecture room, surgical and radiographic rooms, a library and book vaults. There are also offices for the Dean and Secretary of the College and special research laboratories for members of the faculty. In the basement of the building two of the local dental dealers have offices at which the necessary dental equipment and supplies may be purchased. The large operative clinic room is 34 x 166 feet, is well lighted by a north exposure and contains 94 complete outfits consisting of chair, cuspidor and cabinet. In the smaller clinic there are 16 similar operating units. Each Senior student is assigned a chair which he retains throughout the year and maintains as he would his own office.

The dental clinic draws its patients from a city of 20,000 inhabitants and from the 9,800 students in attendance at the University. A large number of patients also come from the surrounding towns and even from some distance in the state, remaining in the city to receive dental services at the clinic. The character of the patients thus attracted is above the average patrons of free dental clinics. They desire the best dental service and are splendid subjects for teaching the highest type of dental practice.

Radiographic and surgical clinics are in operation each day, to which a large number of patients are referred by practitioners of the city and surrounding towns. Patients for these clinics also come from all parts of Michigan and other nearby states.

FORD-MITCHELL MUSEUM

The dental museum is supplied with a large number of anatomical, physiological, pathological, and histological preparations, including a series illustrating dentition from infancy to the completion of the process of the adult, and the normal changes through life to old age, and also illustrative of the dental and osseous tissues. Preparations, natural and artificial, greatly facilitate the study of the nervous and vascular systems. The design is to make available every practicable appliance in this direction.

The odontological collection is probably the largest and best of

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its kind to be found in any dental college in the world. It comprises the entire set of crania and odontological specimens presented by the late Professor Ford, and has been more than doubled in size and value by the gift of the private collection of Dr. William Mitchell, of London, England, who has spent many years and large sums of money in bringing together material from all quarters of the world. Additions to this collection are desired, and gifts of material illustrating comparative odontology and typical or abnormal human teeth, will be gratefully received.

TAFT LIBRARY

A library of dental science (named in honor of the late Professor Jonathan Taft), containing almost every known work on this specialty, including an almost complete file of every dental journal published, is shelved in the Dental building, where it is accessible to all students. A finely appointed reading room is connected with the library. Nineteen dental journals are regularly received.

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities see page 110.

FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance, and no seat will be assigned to a student until after such payment. For the rules governing Second Semester fees and the refunding of fees, see page 117.

MATRICULATION FEE.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *one hundred forty dollars* for men, *one hundred thirty-six dollars* for women; for all others, *two hundred dollars* for men, *one hundred ninety-six dollars* for women. The annual fees include all laboratory fees except the materials used in the chemical laboratories.

GRADUATION FEE.—For all alike, *ten dollars.*

Added information in regard to expenses may be found on page 115.

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Graduate School

A special Announcement giving additional information in regard to the Graduate School is issued annually in March. For copies of this Announcement and for information concerning admission and courses of study which is not given in the Announcement, address Professor Alfred H. Lloyd, Dean of the Graduate School.

The first graduate student of the University is recorded in the catalogue of 1856. The degrees of Master of Arts and Master of Science were earliest conferred, the degree of Doctor of Philosophy being offered for the first time in 1875. Changes made in studies in 1877-1878 had an important bearing on graduate work at the University. This was due to the multiplication of electives and the introduction of the credit system. The seminary method of instruction began then to assume considerable proportions and the movement was strengthened by a growing demand for better trained teachers.

In the spring of 1892 a Graduate School was organized in connection with the College of Literature, Science, and the Arts. Thus provision was made for a more systematic and efficient administration of higher work, and, so far as possible, for the separate instruction of graduate students.

In the fall of 1912 the Graduate School was reorganized so as to include graduate work in all Schools and Colleges of the University. The management of the Graduate School is vested in an Executive Board, including the President and the Dean of the School, and eight others so appointed, two each year for terms of four years, as to represent the different important fields of study.

ADMISSION AND REGISTRATION

ADMISSION

The privileges of the Graduate School are open to graduates of any School or College of this University requiring a four-year course for graduation, and to graduates of other universities and colleges of recognized standing who are qualified to pursue with profit the

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advanced courses of study offered in the University. *But admission to study in the School does not imply necessarily admission to candidacy for a degree.*

Graduates of other institutions whose course of study is not substantially equivalent to that prescribed at this University are required to do an additional amount of undergraduate work before being admitted to formal candidacy for an advanced degree.

For information in regard to enrollment for graduate study in the Summer Session, see page 565.

REGISTRATION

Every applicant for admission to the Graduate School must present himself with his credentials to the Dean. These credentials should specify the degree he has obtained, the courses he has completed leading to his bachelor's degree, the scholarship grades or marks attained or received in each course, and the basis of the grading or marking in force in said institution.

All students of the Graduate School, *whether registered in a previous year or not,* are required to register with the Dean at the beginning of *each year* of residence. *Such registration must be made at the beginning of the year to insure recognition that the residence requirement has been met.*

Blanks showing the course of study the student is pursuing must be filed at the beginning of *each semester or Summer Session at the office of the Graduate School.*

Students may register in the Graduate School at any time up to and including the first Saturday of the semester. *After this day students may register only with permission of the Dean, and upon payment of an additional fee of* $5.00. This fee may, in special cases of enforced absence or illness, be remitted upon application to the Dean of the School.

Undergraduates of this University, who at the beginning of a given semester are within three hours, or at the beginning of a Summer Session within two hours, of graduation, may be permitted to register in the Graduate School and have that semester or Summer Session counted toward the residence requirement for a higher degree. Such students must pay the fees required in the undergraduate College or School in which they are primarily registered.

Students who finish the undergraduate course of this University at the end of the first semester and who continue their residence for the remainder of the year, are permitted to register in the School and thus secure the privileges of its membership, even though the bachelor's degree is not conferred until the close of the year.

Applicants who do not wish to become candidates for a degree, may be admitted and registered as special graduate students. Such graduate students must designate, and have approved by the Dean, the general lines of study which they wish to pursue. Students hav-

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ing a bachelor's degree but wishing only to complete preparation for admission to a professional school, are not admitted to the Graduate School. They should enroll in the College of Literature, Science, and the Arts.

Students who withdraw from the School during the academic year are requested to inform the office without delay of such withdrawal.

Changes of subjects originally selected must be reported to the Dean for approval.

UNIVERSITY FELLOWSHIPS

Ten University Fellowships with an annual value of $300 and five with a value of $500 each have been established by the Board of Regents. Applications for appointment to these fellowships, which are open to graduate of any college or university of recognized standing, must be made to the Dean of the Graduate School upon special blanks obtainable from him upon request.

Each fellow shall pursue his studies under the direction of the professors in charge of the departments in which he elects his subjects. (See pages 553 to 560.)

Fellows are appointed for a term of one year, but may be eligible for reappointment.

Holders of fellowships are required to pay the matriculation fee (if not already paid), the annual fees, the diploma fee, laboratory expenses, and similar charges, the same as other students of the school or college in which their work lies.

Applications for appointment to these fellowships should be made to the Dean of the Graduate School before March 1 of the year preceding the appointment.

STATE COLLEGE FELLOWSHIPS

By the action of the Board of Regents of the University of Michigan, the faculties of ten colleges in the State of Michigan, are authorized to nominate each year to the administrative officers of the Graduate School, some member of their respective senior classes, or one of their graduates of not more than four years' standing as a suitable candidate for a State College Fellowship, with a stipend of $300, for the next academic session. Such candidates, when duly appointed by the Board of Regents, shall be placed on the same footing and be subject to the same regulations as the University Fellows. (See above.) All nominations, accompanied in each case by a brief statement of the nominee's fitness for appointment and an indication of the lines of graduate work he expects to pursue, should be on file

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in the office of the Graduate School not later than May 1. Each college should also nominate an alternate to the regular candidate.

OTHER FELLOWSHIPS

For other fellowships open to students enrolled in the Graduate School, see page 103.

CHARACTER OF GRADUATE WORK

The essential feature of graduate work is specialization of study. Every graduate student is expected to acquire an intimate knowledge of his field of study and of the methods employed in this field so that he will be able to approach his subject in an independent and critical spirit. After a student has selected the department of study in which he wishes to specialize, his work will be under the immediate supervision of the professor in charge of the subject of specialization or, in case of study for the highest degrees, of a special committee appointed by the Dean. This professor or this committee will arrange a course of study suited to the student's desires, needs, and previous attainments, will assist him in the choice of a subject for a dissertation, if such be required, pass judgment upon his dissertation when it is written, conduct his examination, and, if the examination is creditably sustained, report him to the Executive Board as worthy of the degree sought. The nature of the work prescribed, and of the supervision, varies according to the subject chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of original research to be carried on more or less independently.

A student may elect work in more than one School or College provided the courses chosen form a coherent group. Advanced undergraduate courses will be accepted in partial fulfillment of the requirements for a degree under conditions prescribed by the Executive Board. It is expected that all work done by a graduate student will be of superior grade.

Although the work of the Graduate School is in large part planned with reference to the needs of those who desire to specialize in definite subjects, the opportunities of the School are open to other students as well.

DEGREES CONFERRED

The degrees conferred on the completion of approved courses of study in the Graduate School are Master of Arts, Master of Science, Master of Arts (or Master of Science) in Municipal Administration,

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Master of Science in Chemistry, Master of Science in Forestry, Master of Landscape Design, Master of Science in Engineering, Master of Science in Architecture, Master of Science in Public Health, Mechanical Engineer, Civil Engineer, Electrical Engineer, Chemical Engineer, Marine Engineer, Aeronautical Engineer, Architect, Naval Architect, Doctor of Philosophy, Doctor of Science, and Doctor of Public Health.

THE MASTERS' DEGREES—A.M., M.S.

A student who has been admitted to study for the master's degree may be recommended for the degree after one year of resident study at this University provided that the year has been spent in taking full work in studies of graduate grade, that these studies show unity of interest, and that a satisfactory record has been made.

The degree of Master of Arts is the one usually conferred, though candidates who pursue scientific studies may at their option receive the degree of Master of Science.

The work done in residence is mainly in courses of study regularly announced, but private work is often undertaken under special direction.

A student who has received the bachelor's degree from a college not of sufficiently high standing, or who has not previously taken such courses as are required in preparation for graduate work, must expect to spend more than one year in residence, the length of time to be determined in each case by the character of his previous work and the quality of his work in this School.

All graduate students taking regularly announced courses of study are expected to attend the examinations given in such courses.

MASTER OF ARTS OR MASTER OF SCIENCE IN MUNICIPAL ADMINISTRATION—A.M., M.S.

Candidates for the degree of Master of Arts (or Master of Science) in Municipal Administration must possess the bachelor's degree. The course of instruction covers at least one academic year, together with at least three months in specified work in the field. It is expected that all who enroll for the degree should have had courses in elementary Political Science and Economics, each equivalent to six semester hours work. While a few of the courses may be taken during the Summer Session, most of them are given only during the regular academic year. All candidates for the degree are subject to the general rules and regulations of the Graduate School.

For detailed information as to the course requirements, see the regular bulletin of the Graduate School.

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MASTER OF SCIENCE IN CHEMISTRY—M.S.

In 1919 the Regents, at the request of the Department of Chemistry and on recommendation of the Executive Board of the Graduate School, voted to establish the special degree of Master of Science in Chemistry. All candidates must have met the requirements of the University for the degree of Bachelor of Science in Chemistry and for appointment to the degree must have completed successfully a full academic year of graduate study in approved courses in Chemistry and cognate subjects.

MASTER OF SCIENCE IN FORESTRY—M.S.F.

The work of candidates for the degree of Master of Science in Forestry is under the immediate supervision of the professor of Forestry and consists mainly of prescribed courses. The department of Forestry publishes annually a special Bulletin which contains full information concerning the work leading to this advanced degree.

Candidates for the degree of Master of Science in Forestry may be conveniently divided into three classes:—

1. Graduates of this University, who have received either the degree of Bachelor of Arts or Bachelor of Science and have completed the courses prescribed for the first four years by the department of Forestry. Such students are usually permitted to complete the requirements for the master's degree in one year.

2. Graduates of this University and of other institutions of recognized standing, who have successfully pursued courses in general science approximately equivalent to those prescribed for the first four years, are required to spend two years in residence in order to obtain the master's degree.

3. Graduates of this University and of other colleges and universities of approved standing, whose preparation is deficient in some of the important required courses, notably in botany and in other natural history subjects, are required to spend a longer period in order to satisfy the requirements for the degree of Master of Science in Forestry. This period will depend upon the preparation and ability of the student.

Candidates for the degree of Master of Science in Forestry are subject to the same regulations as candidates for the degree of Master of Arts or of Master of Science. (See page 554.)

MASTER OF LANDSCAPE DESIGN—M.L.D.

Graduates of this University with the degree of Bachelor of Landscape Design will receive the degree of Master of Landscape Design upon the successful completion of the requirements for the same. The graduate work in Landscape Design consists largely of prescribed courses and may, in general, be completed in one year. A

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special bulletin giving full description of courses in Landscape Design may be had upon application to the Secretary of the University.

MASTER OF SCIENCE IN ENGINEERING—M.S.

All students wishing to study for an advanced degree in Engineering must have received the bachelor's degree from this University, or from some other university or technical school of recognized standing. According to the previous training in engineering studies, two classes of students may be distinguished.

A

A graduate from the Colleges of Engineering and Architecture of this University or from a technical school of recognized standing who wishes to continue his work in the same branch of engineering or architectural study in which he has received the corresponding bachelor's degree, will find it possible to complete the work required for the master's degree in one year, provided his work proves to be of superior grade.

B

A graduate whose training in Engineering has not been equivalent to the courses offered by the Colleges of Engineering and Architecture of this University must expect to spend more than one year in the Graduate School before he will be allowed to receive his degree. The length of time varies with the previous attainments of the student and the character of his work. Unless previously completed, the equivalent of the following undergraduate curricula must be taken by the student before being admitted as a candidate for the degree of Master of Science in Engineering; the English, Foreign Language, Mathematics, Physics, Chemistry, Descriptive Geometry, and Engineering Mechanics required of all students except architects in the College of Engineering, and in addition at least fifteen hours of the fundamental technical requirements of the group in which he desires to specialize.

A student presenting the minimum requirement must spend at least two years on an approved course of study and complete it with more than average standing.

Should a student be required to take more than a year's work from the undergraduate courses above mentioned, he will not be allowed to enter the Graduate School, but must enroll in the College of Engineering.

Candidates for the degree of Master of Science in Engineering are subject to all the general regulations for the master's degree, (see page 554.) In addition, they are required to write a satisfactory thesis.

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MASTER OF SCIENCE IN ARCHITECTURE—M.S.

All students wishing to study for the degree of Master of Science in Architecture must hold the corresponding bachelor's degree from this University or some other institution of recognized standing. The graduate work must be of advanced character, a thesis in the design and construction of some building being required in the second semester of the graduate year.

All students in this course are subject to the general regulations of the Graduate School. (See pages 550 and 553.)

MASTER OF SCIENCE IN PUBLIC HEALTH—M.S.

Candidates for the degree of Master of Science in Public Health must possess the degrees of Bachelor of Arts or Bachelor of Science or Doctor of Medicine. The course of instruction covers one academic year, beginning with the opening of the University in the fall, and continuing until the following June. At the close of the course a diploma of Master of Science in Public Health will be given to all who successfully complete their courses and show fitness for work in public health. The moral character of applicants for the degree must be shown to be above question.

All candidates for the above degree are subject to the rules and regulations of the Graduate School. (See pages 550 and 553.)

THE ENGINEER'S DEGREE

Civil Engineer—C.E.; Mechanical Engineer—M.E.; Electrical Engineer—E.E.; Chemical Engineer—Ch.E.; Naval Architect — Nav. Arch.; Marine Engineer — Mar.E.; or Architect—Arch.

These advanced degrees will be conferred only upon persons who have proved their ability to plan and direct professional work or original investigation in applied science.

A candidate for any of these degrees must have received a bachelor's degree from an approved college at least five years before registration for the advanced degree. He must have been engaged in professional work, in responsible charge of the same for at least one year, and must present at the time of registration a detailed account of his professional experience at that time, which must be approved by the Executive Board after consultation with the committee appointed by the Dean.

He must have pursued before receiving the degree an amount of advanced study equivalent to at least one year's work at the University. This work must have been performed under the direction of a special committee, or be approved by such a committee. Those who have received the degree of Master of Science in Engineering from this School may be excused from part of the advanced study

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required, in case the work done for the master's degree is, in the opinion of the committee, acceptable towards the higher degree.

He must also present a satisfactory thesis giving evidence of his professional attainments and his fitness to receive the degree sought.

A copy of the thesis must be in the hands of the Dean not later than May 1, if the candidate wishes to receive his degree at Commencement. Candidates for these degrees usually register in absentia (for fees, see page 562).

THE DOCTOR'S DEGREES—Ph.D., Sc.D.

The doctor's degree is conferred solely in recognition of marked ability and scholarship in some relatively broad field of knowledge such as the Ancient Languages, Philosophy, History, Political Science, Physics, Chemistry, etc. For this purpose the student will be required to work under the direction of a special committee. A portion of the work consists in pursuing regularly announced graduate courses of instruction in the chosen subject, and in such cognate subjects as may be selected by the student and approved by the committee. However, the principal method of developing a mastery of the subject consists in pursuing independent research work in some subdivision of the selected subject, and the scholarly presentation of the result of such investigation in the form of a dissertation.

No definite term of required residence can be specified. As a rule, three years of graduate study are necessary, the last two semesters of which must be spent at this University. This last requirement may be waived, however, in the case of Bachelors of this University who have spent one year in redicence pursuing courses leading to an advanced degree. Credit may be allowed for graduate courses taken in other universities of recognized standing. Exceptions to the rule requiring three years of graduate study may be made only on the permission of the Executive Board upon special application.

A student wishing to become an applicant for the doctor's degree should first confer with the professor representing the subject of specialization, and then with the Dean. Admitted to study, he will work under supervision of a specially appointed committee. Admission to study, however, does not imply formal admission to candidacy.

A student wishing to become a candidate for the doctor's degree must make formal application to be so enrolled at least two semesters prior to the time for presenting himself for examination. At this time the subject of the dissertation must be chosen and approved by the committee concerned.

No student shall be registered as a candidate for the doctor's degree until he has done one year of satisfactory graduate work in the Graduate School of this or some other university of recognized standing.

No student will be accepted as a candidate for the doctor's de-

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gree who has not a knowledge of French and German sufficient for purposes of research.

The degree of Doctor of Philosophy is the one usually conferred, though candidates who pursue studies along scientific lines may at their option receive the degree of Doctor of Science.

DOCTOR OF PUBLIC HEALTH—D.P.H.

Candidates for the degree of Doctor of Public Health must possess the degree of Bachelor of Arts or Bachelor of Science or Doctor of Medicine. Their first year's course is identical with that prescribed for the degree of Master of Science in Public Health. The second year's work must be spent in research work in one or more of these subjects, with the presentation of a dissertation containing original work of sufficient merit, which must be passed upon by and defended before all the members of the Faculty concerned in the giving of the courses. A portion of the prescribed work may be taken elsewhere, but the right to do this must be left with the special committee in charge of the candidate's work.

THE DOCTOR'S DISSERTATION

The dissertation must exhibit creditable literary workmanship, but its acceptance depends more upon its subject-matter than upon its rhetorical qualities. It must be an actual contribution to knowledge and must be founded upon the author's own investigations carried on under the direction of his committee. The treatment should be as concise as the nature of the subject permits. Every dissertation should contain a clear introductory statement of the problem investigated, and likewise a final résumé of results. It should be preceded by an analytical table of contents, with page references, and a full list of the authorities consulted. The larger divisions and the more important minor divisions should be indicated by suitable headings. It is expected that the preparation of an acceptable dissertation will require the greater part of an academic year.

The dissertation must be completed and at least one typewritten, bound copy placed in the hands of the Dean of the Graduate School as early as the first of May of the year in which the candidate expects to take the degree. This copy will remain on file in the office of the Graduate School. A duplicate copy is often desirable, greatly facilitating the work of the examiners. If the examination of the candidate is to take place on some other date than in the month of June the dissertation must be in the hands of the Dean at least one month before the candidate can present himself for examination.

Every candidate for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Public Health, in case of the acceptance of

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his dissertation, is required to have the dissertation printed in full or in part, as may be approved by the responsible committee. To guarantee the printing of the dissertation, he is required to deposit with the Treasurer of the University, between the date of the acceptance of the dissertation and the time fixed for his examination, the sum of fifty dollars. This deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his dissertation to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee. The candidate is required to deposit one hundred fifty copies of the printed dissertation in the University library, these copies to be used for exchange with other universities. Provision has been made, however, that in cases where this requirement would work hardship, it may be waived on recommendation of the candidate's committee.

In the printing of this dissertation at his own expense the candidate will be expected to use good, substantial paper, and sightly typography. A page four inches by six, with outside margins of at least one inch, is recommended. The dissertation must be found with cover and title-page, and the latter, in addition to the title and name of the author, must bear the following inscription: A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (or of Science, or of Public Health), in the University of Michigan.

EXAMINATIONS

All graduate students in attendance upon regular courses in which stated examinations are held, whether during the semester or at its end, are required to take these examinations with the classes concerned.

No final examinations for the master's degree will be required unless demanded by the department in which the student specializes.

The final examinations of candidates for the doctor's degrees are commonly held during the first part of June; but the examinations can usually be arranged at any time when a candidate has fulfilled all the technical requirements and has satisfied his committee and the Dean that his work has been such as to warrant an examination.

After the candidate has completed all work except the dissertation he may be given a preliminary examination, covering this work. In this case the final examination will be on the subject of the dissertation only.

Ordinarily the examinations are oral, and in each case they are held before those comprising the special committee in charge of the candidate's work and before such others as may be appointed by the Dean. The examination may be preceded by such written or oral tests as individual instructors consider necessary.

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WORK IN ABSENTIA

As a rule work *in absentia* is not permitted, but a student who has practically completed the work required for a degree, may be allowed to continue his studies for the degree without further residence at the University, on such conditions as the Executive Board may determine in each case. *In the case of the master's degree this privilege is restricted to graduates of this University.* Candidates who find it necessary to complete a portion of their work *in absentia* are required to petition the Executive Board through the Dean for such privilege, and if the petition is granted, they must register *in absentia* and keep the Dean informed of their continued connection with the School and of the progress of their work.

Candidates for the engineer's degree who have completed the graduate work required for the degree usually complete the thesis as students *in absentia.*

RULES GOVERNING PARTICIPATION IN PUBLIC ACTIVITIES

For the rules governing participation in public activities see page 110.

SUMMER SESSION

Graduate students who are regularly matriculated in the University, may carry on work during the Summer Session which will count toward an advanced degree. Graduates of other universities or colleges of similar standing, who are competent to enroll for a higher degree, may, upon the payment of a fee of *thirty-five dollars,* matriculate in the University and begin graduate study during the Summer Session. This fee of *thirty-five dollars,* includes the regular matriculation fee and the fee for the current Summer Session.

Candidates for the master's degree, if graduates of the University of Michigan, may receive the degree after attendance upon three Summer Sessions of this University, supplemented by satisfactory work done *in absentia* under proper direction.

Graduates of other institutions who have been admitted to candidacy for the master's degree, may be recommended for the degree after attendance upon two Summer Sessions and one semester's residence in the University, or after attendance upon four Summer Sessions.

Full information concerning graduate courses in the Summer Session may be found in the Announcements of the Graduate School and of the Summer Session. These Announcements may be obtained from the Dean of the Graduate School.

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FEES AND EXPENSES

The Matriculation Fee and the Annual Fee must be paid in advance. For the rules governing the Second Semester fees and the refunding of fees, see page 117.

MATRICULATION FEE.—For Michigan students, *ten dollars;* for all others, *twenty-five dollars.*

ANNUAL FEE.—For Michigan students, *eighty dollars* for men *seventy-six dollars* for women; for all others, *one hundred five dollars* for men, *one hundred one dollars* for women. The annual fee required for all graduates who are granted the privilege of pursuing studies for a master's degree *in absentia* is *ten dollars.*

PENALTY FOR LATE REGISTRATION.—After the first Saturday of the semester students may register only with permission of the Dean, and upon payment of an additional fee of *five dollars.*

SUMMER SESSION FEE.—For matriculates, *thirty dollars;* for non-matriculates, *thirty-five dollars.* See Summer Session above.

PART TIME FEE.—Persons engaged in teaching in public, parochial or private schools, as well as practicing engineers and physicians, who are regularly admitted as students in the Graduate School, may elect not more than five hours a week, upon the payment of a fee of *ten dollars* in lieu of the regular annual fees. Such students must pay the matriculation fee the same time as other students.

This privilege of enrolling at an annual fee of ten dollars is extended to students in the Graduate School who have completed their course work for the doctor's degree, but have not completed the dissertation requirement.

GRADUATION FEE.—For all alike, *ten dollars.* A fee of *two dollars* is charged for the Teacher's Diploma.

For Laboratory fees and other expenses see page 115.

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Summer Session

A special Announcement of the Summer Session, containing further particulars than are given here in regard to the courses of instruction, etc., is published annually. Copies of this Announcement can be had by addressing Mr. Shirley W. Smith, Secretary of the University.

In the Summer Session of the University, courses of instruction are offered in the College of Literature, Science, and the Arts, the Colleges of Engineering and Architecture, the Medical School, the Law School, the College of Pharmacy, and the Graduate School. The College of Dental Surgery offers those parts of the regular curriculum in Dentistry which are taught in the College of Literature, Science, and the Arts and the Medical School, consisting of courses in Chemistry, Physics, and Anatomy. The University also conducts courses in Library Methods, in Embalming and Sanitary Science, and in Public Health Nursing, and maintains an Engineering Camp and Biological Station at Douglas Lake in Cheboygan County, Michigan.

While these courses are, for the most part, equivalent in every respect to the courses given during the Academic Session, special advantages are offered to advanced and graduate students.

The Administration of the Summer Session of 1921 is in charge of EDWARD H. KRAUS, Dean, and THOMAS E. RANKIN, Secretary, and the following: ARTHUR G. HALL, Registrar, College of Literature, Science, and the Arts; LOUIS A. HOPKINS, College of Engineering and Architecture; CHARLES W. EDMUNDS, Medical School; EVANS HOLBROOK, Law School; CLIFFORD C. GLOVER, Pharmacy; ALFRED H. LLOYD, Dean of the Graduate School; CLARENCE T. JOHNSTON, Director of Camp Davis; and GEORGE R. LARUE, Director of the Biological Station.

In the summer of 1921 the session will open on Tuesday, July 5, and continue for eight weeks, except in the Medical and Law Schools. The session in the Medical School is six weeks in length. In the Law School the session will open on Monday, June 27, and will continue for ten weeks.

REQUIREMENTS FOR ADMISSION

There are no formal requirements for admission to the Summer Session; its courses are open to all persons qualified to pursue them to advantage. Students who have been dismissed from the University will not be allowed to enter the Summer Session without the consent of the Dean of the School or College of which they were members.

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REGISTRATION

In order to facilitate arrangements for the accommodation of prospective students, it is urged that all persons contemplating work in the Summer Session should notify the Secretary on or before June 27. The offices of the University Treasurer and of the several Secretaries will be open for the registration of students on Friday and Saturday, July 1 and 2. So far as possible, it is expected that all students will arrange to reach Ann Arbor by July 2, in order to secure rooms and to register.

Students desiring to pursue courses in law are requested to register on June 24 and 25, as the work in that School begins on June 27.

To register the student must enroll with the Secretary of the School or College in which he wishes to pursue studies, and pay his fees to the Treasurer. No student will be admitted to classes in any School or College except upon presentation of the Treasurer's receipt.

CREDIT FOR COURSES

Regular students of the University will receive credit toward graduation for work done in courses of University grade, upon passing satisfactory examinations at the close of the season. A record is kept of all University credits earned by students and these credits may be applied toward a degree in case the student becomes, subsequently, a candidate for a degree. The number of hours credit allowed for courses offered in the various Schools and Colleges is indicated in connection with the description of the courses, and where no such mention is made no credit is given. Since the work of the Summer Session is equivalent to similar work of the academic year, it is now possible for a student to secure the degree of Bachelor of Arts or Bachelor of Science by attendance upon three academic and three Summer Sessions. Similar reductions in time are also possible in all other colleges or schools save the Medical School.

In the College of Literature, Science, and the Arts, and the Colleges of Engineering and Architecture, the maximum amount of credit given for work done in any one Summer Session is eight semester hours.

Requests for further information concerning credits should be addressed to the Secretary of the School or College in which credit is desired.

CREDIT CERTIFICATES

Students of the Summer Session who are not matriculated in the University will, upon request, receive certificates of attendance and of work satisfactorily performed. Application for these certificates must be made at least two weeks before the close of the Session.

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GRADUATE WORK

All graduate courses are open to students who are properly qualified to pursue them. Graduate students who are regularly matriculated in the University and properly registered with the Dean of the Graduate School, may carry on work during the Summer Session which will count toward an advanced degree. (See Matriculation below.)

Candidates for the master's degree, if graduates of the University of Michigan, may present themselves for examination after attendance upon three Summer Sessions of the University, supplemented by satisfactory work done *in absentia* under the direction of the proper committee. Graduates of other institutions may present themselves for examination for such degree either after attendance upon four Summer Sessions or after two Summer Sessions and one semester's residence in the University.

Candidates for the doctor's degree will find that the Summer Session sometimes offers special opportunities for research work. Detailed information concerning the requirements for the doctor's degree may be obtained from the Dean of the Graduate School.

MATRICULATION

Formal admission to the University and payment of a matriculation fee are not required for students of the Summer Session. Those who so desire, however, may be admitted and matriculated upon presentation to the Dean of the School or College they desire to enter, of proper credentials fully covering the requirements for admission.

Persons desiring to matriculate at this time should mail their credentials to the Dean of the School or College concerned, at least one month before the opening of the Summer Session.

The matriculation fee, which is ten dollars for a citizen of Michigan, and twenty-five dollars for a person who comes from any other State or country, is paid but once, and entitles the student to the privileges of permanent membership in the University.

Graduates of any reputable college or university, who in the judgment of the Dean of the Graduate School are competent to enroll for a higher degree, may, upon the payment of a fee of *thirty-five dollars*, matriculate in the University and enter upon graduate study during the Summer Session. This fee of *thirty-five dollars* includes the regular matriculation fee and the fee for the current Summer Session.

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FEES

The fee for the Summer Session in the College of Literature, Science, and the Arts, the Colleges of Engineering and Architecture, the College of Pharmacy, and in the Graduate School, is $30.00, regardless of the number of courses taken. This fee will be required of those who wish to attend as visitors, as well as those who wish to do regular work and attend the examinations.

In the Medical School the fee is $30.00.

In the Law School the fee is $37.50.

In Embalming and Sanitary Science the fee is $75.00.

Each student will be required to register in the School or College in which the major part of his work is done, and if he desires to elect work in another School or College in which the fee is higher, he will be required to pay an additional fee of $5.00 for each course so elected. It is to be understood that in all cases where laboratory or demonstration fees are required, such fees are to be paid in addition to the regular Summer Session fee.

For additional information concerning fees and expenses, see page 115, and also under Matriculation, page 565.

COURSES OF INSTRUCTION

The courses offered for the Summer Session of 1921 are specified in this Catalogue at the end of the description of the courses given by the departments involved, excepting the special work listed below.

COLLEGE OF DENTAL SURGERY

The College of Dental Surgery offers during the Summer Session those parts of the regular course in dentistry which are taught in the College of Literature, Science, and the Arts and the Medical School.

LIBRARY METHODS

1. Introduction to Library Work. *Two hours.* Professor BISHOP.
2. Elements of Cataloguing. *Three hours.* Professor WALTER.
3. Elements of Classification and Ordering. *One hour.* Professor WALTER.

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4. Elementary Reference Work. *One hour.* Miss GILLETTE.

5. Book-binding. *One hour.* Mr. HOLLANDS.

6. The High School Library. *Two hours.* Professor ROOT.

7. Book Selection and Book Buying, particularly for High Schools and Smaller Public Libraries. *One hour.* Professor ROOT.

8. The High School Library, with special reference to the University Extension Service. *One hour.* Miss THOMAS.

BIOLOGICAL STATION

ZOOLOGY

101. The Natural History of Vertebrate Animals. *Two hours.* Professor SMITH.

103. The Natural History of Invertebrate Animals, with special reference to the Principles of Ecology. *Four hours.* Assistant Professor WELCH.

105. The Natural History of Insects. *Two hours.* Professor ———.

107. Ornithology. *Two hours.* Professor ————.

109. Special and Research Work in Zoölogy. *Two, four, six,* or *eight hours.* Professors LARUE and SMITH, and Assistant Professor WELCH.

BOTANY

102. Cryptogamic Botany. *Two hours.* Assistant Professor NICHOLS.

102*b*. Taxonomy of the Bryophytes. *Two hours.* Assistant Professor NICHOLS.

104. Systematic Botany. *Two hours.* Assistant Professor EHLERS.

106. Ecology. *Four hours.* Assistant Professor GATES.

108. Plant Anatomy. *Two hours.* Assistant Professor NICHOLS.

110. Advanced Systematic Botany. *Two hours.* Assistant Professor EHLERS.

112. Special Work and Research Work in Botany. *Two, four, six,* or *eight hours.* Assistant Professors GATES and EHLERS.

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EMBALMING AND SANITARY SCIENCE

1. Bacteriology and Sanitary Science. Mr. ————.
2. Chemistry. Mr. SCOTT.
3. Anatomy. Professor MCCOTTER.
4. Autopsy Technique. Assistant Professor WELLER.
5. Mortuary and Probate Law. Professor ————.
6. Practical Embalming. Mr. FARLEY.

PUBLIC HEALTH NURSING

Field Work. Professor BARBARA H. BARTLETT, Miss EMILY DANIEL, Mrs. LYSTRA GRETTER, and Miss GRACE ROSS.

Theoretical Work. Professor BARBARA H. BARTLETT, and others.

PHYSICAL TRAINING

Courses for Women

1. General Gymnastics.
2. Corrective Gymnastics for Individual Improvement.
3. Aesthetic Dancing.
4. Tennis, Archery.
5. Swimming.
6. Normal Class in Folk Dancing and Games for School-room and Playground.

Courses for Men

1. General Gymnastics and Physical Training.
2. Corrective Gymnastics.
3. Treatment of Emergencies.
4. Anthropometry.
5. Special Contest Exercises.
6. Tennis Tournament.

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List of Graduates of 1920*

COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS†

BACHELOR OF SCIENCE
(in Medicine)

Newton Warren Bourne
Donald Roberts Brasie
Nils Olaf Byland
Uri Alonzo Carpenter
Harold Bartholomew Fenech
Louis Joseph Gariepy
*Bruce Alexander Harris
Joseph David Heiman
Paul Mills Ireland
Ezra Lipkin
Wilfrid Edward Muldoon
**Solomon George Myers
Henry Leon Smith
*William Axel Smith
**Joseph Hume Taylor
*Edward Adolph Wishropp

16

BACHELOR OF SCIENCE
(in Forestry)

James Cass Andrews
Harold Wood Branson
Harry Ebert Dobbins
Richard Charles Ely
Thomas Stanhope Flournoy
**Albert Clarence Foley
Donald Richmond Hook
**Renus Edward Johnson
William Gale Lush
Waldo Jay Murphy
Carl Emanuel Pardon
William Henry Perine
*Frank Lindley Tobey
John Vernon Wagar
James Merrill Walley
Cyril Bertram Webster

16

BACHELOR OF SCIENCE
(in Chemistry)

Adam Glenn Aitchison
*Selma Laura Bandemer
**Francis Huntington Case
Stuart Johnson Colvin
Hazel Katherine Platt
Walter Hamilton Rising

6

BACHELOR OF SCIENCE

Lula Mertace Canan
J. Verne Crandall
Irving Sanderson Ellison
Clarence Epstean
Florence Lillian Field
Delcia Marguerite Gilbert
*Marshall Adelbert Goff
Frederick Truman Hawley
James Franklin Hunter
Carl Philip Martzloff
William Randolph Medville, *As of the Class of* 1901
Dueber Hampden Phillips
Floyd Otto Reynolds
Lee Michael Rosenbluth
Joseph Rubins
Ewald George Willie Schulz
Harley Bakwel Sherman
**Harry Stocker
Verne LaRue Stout
Claude Strother

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* The list of Graduates contains the names of all persons on whom degrees were conferred during the year 1920.

† Those graduates of the College of Literature, Science, and the Arts whose names are preceded by an asterisk (*) receive their degrees "With Distinction"; those whose names are preceded by a double asterisk (**) receive their degrees "With High Distinction."

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BACHELOR OF ARTS

Elsie Amanda Abbott
Ruth Alden Abbott
Agnes Louise Abele
Maurice Abelman
**Adelaide Alice Adams
Ivy Victoria Adams
**John R. Adams
Annabel Ardeth Adriance
George Byron Alan
Rutgers Alexander
Amelia Carolyn Miller Altvater
**Henry Hugh Altvater
*Marion Amelia Ames
George Dewey Anderson
Henry Hart Anderson
Philo Peebles Andrews
Edna Lucking Apel
Nina Faith Armstrong
Lincoln Avery, Jr.
Paul Oliver Avery
Reed Ernest Bachman
Donald Hook Bacon
Lilla Belle Bacon
Myrtle Alice Bahm
*Clara Ellen Bailey
James Millard Bailey
Catherine Baillio
Frederick Clever Bald
William John Balgooyen
Edith Mary Barley
**Margaret Barlow
Esther Laurel Barnes
Russell Curtis Barnes
Nicholas Bartholomew Bartz, Jr.
Edith Elizabeth Battersbee
Joseph Lloyd Battista
Frederick Bauer
Thelma Louise Baughman
Muriel Elsby Bauman
Mary Sarah Bavly
Raymond Reynolds Beardsley
Jacob William Beckmann
Dorcas Sarah Beebe
*Abram Cornelius Benjamin
*Claude Leon Benner
Harry Percival Bennett
Gertrude Celest Benson
Myrtle Elizabeth Bice
Margaret Lucy Bird
Clark Wallace Bishop
Edgar Spencer Blackman
Edna Lois Blake
Frances May Blakeslee
Hannah Blumenthal
Blanche Beulah Blynn
Otto William Bodamer
Mary Cecelia Bogan
Kenneth Davis Bond
Wilfred Robert Borinstein
William John Bossenbroek
Oets Kolk Bouwsma
Emily Bowmar
Gladys Abigail Boyington
Robert John Bradfield

As of the Class of 1918

Naomi Sarah Bradley
Helen Merrill Bramble
Forrest Silas Briggs

As of the Class of 1919

Elmer Otis Brinkman
Harold Hudson Britton
*Joseph Walter Britton
Arthur Wykes Brown
**Bernice Ione Brown
Lena Velma Brownell
Harold White Buck
Edward Buckner
Clifford Chappius Buehrer
Lawrence Hadley Burchard
Warren Selby Burchell
Elizabeth Melva Burgess
Edmund Burke
Vera Grace Burke
Roby McKinley Burley
*Margaret Elizabeth Burnham
Marion Elizabeth Bush
*Jean Francis Butcher
Helen Grace Cady
*Paul Devoe Cahow
Lois Ethleen Calkins
Leonard James Call
Donald McKenzie Campbell

As of the Class of 1918

Edna Anna Campbell
**Helen Elizabeth Campbell
Wilbur Forest Campbell
Harry McElhinney Carey
Ada Elizabeth Cargo
**Lowell Juilliard Carr
John Cornelius Cary
Ada Beatrice Catlin
Henry Lewis Caulkins
Ruth Loretta Cavanaugh
Roy Albert Chandler
Irving Steele Chapin
**Marguerite Chapin
*William Keith Chidester
Chester Charles Chopp
Helen Flora Amanda Christen
Margaret Christie
Haldon Hixon Cites
Irving Granderson Clapham
Albert Anderson Clark

As of the Class of 1919

Ben Rollin Clark
Charles Spencer Clark
Ella Maybelle Clark
Fred R. Clark
Charles Upson Clarke
Sarah Clarkson
Cora Lillian Coleman
Kins Sidney Collins

As of the Class of 1918

*Dorothea Calhoun Comfort

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Hugh Augustus Cook
Margaret Carroll Cook
Lena Francis Corbin
George William Corwin
Harry Rene Cossitt
Irene Jessie Crabb
William Donald Craig
As of the Class of 1919
*Charles William Creaser
Earl Henry Cress
Elmer Weirich Cress
Arthur Gordon Cross
Dorothy Marguerite Cross
*Anna Mai Crow
Florence Sunshine Crozier
**Denman Hirth Cruttenden
As of the Class of 1919
Glenn Howard Cummings
Lillian Currah
Claude Dale Curtiss
*Carl Enoch William Leonard Dahlstrom
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Irma Marie Neumann
Max Hodges Vann
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Emily Gibb Edwards	Houghton
Frank Merriman Edwards	Utica, N. Y.
Tom Strong Edwards	Rockwood
Alfred Victor Efroymson	Indianapolis, Ind.
Carl George Egeler	Lansing
†Ralph Waldo Eggert, *e*	Buchanan
George Elmer Ehrke	Cleveland, Ohio
Raymond August Ehrke	Cleveland, Ohio
Sadie Harriet Ehrlich	Detroit
Herbert Frederick Eibler	Ann Arbor
Walter George Eibler	Ann Arbor
Norman John Eick	Wilson, N. Y.
Carl George Eisele	Flint
Lloyd Edward Eisele	Phoenix, Ariz.
Isidore Hyman Eisenberg	Detroit
Walter Oliver Ekeblad	Gladstone
Edgar Deloss Eldredge	LaSalle, N. Y.
George Raymond Elledge	Farmington, Mo.
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Wallace Fordham Elliott	San Francisco, Calif.
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Ralph Taylor Ellis	Upper Sandusky, Ohio
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Carleton Stewert Ellsworth	Battle Creek
Lois Elwood	Menominee
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Ione Marie Ely	Ann Arbor
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Norma Emerson	Wellsville, N. Y.
†Lawrence Bates Emery, *e*	Benton Harbor
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Carl Emanual Enggas	Kansas City, Mo.
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Parke Flournoy Engle	Forest Glen, Md.
Cortez Alfonso English	Gifford, S. C.
Robert Dewey Eno	Hamburg, N. Y.
Germ Gerald Ensing	Holland
Sanford Hayes Ensinger	East Aurora, N. Y.
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Maxwell A. Erbaugh	Denver, Colo.
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Carl Oscar Erlanson	Aurora, Ill.
Louis Philip Erlenbach	Saginaw
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Max Anderson Ewing	Pioneer, Ohio
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Carrie Fairchild	Wyandotte
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Neal B. Fearron	Sparta
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Minetta Marie Goetz	Ann Arbor
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Ruth Hewitt Goodhue	Cleveland, Ohio
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Alva Joanna Gordon	Holly
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William Maile Goss	Lakewood, Ohio
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Alexander Gregory	Marshall
Edward Payson Gregory	Howell
Helen Gregory	Howell
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Charles Johnston Hayden	Benton Harbor
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Earl Augustine Heilner	Toledo, Ohio
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Junetta Christine Heinonen	Negaunee
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Edith Hellman	New York, N. Y.
Earl Lee Heminway	South Haven
Florence Clara Hemingway	Gary, Ind.
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Mary Henderson	Houghton
Mary S. Henderson	Kalamazoo
Thelma Fidessa Henderson	Youngstown, Ohio
William Peter Henderson	Detroit
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Clara Belle Smallidge	Tekonsha
Robert Ferrell Smart	Chicago, Ill.
Winifred Isobel Gray Smeaton	Ann Arbor
George O. Smiley	Coldwater
Agnes Smith	Muncie, Ind.
Arthur Mumford Smith	Ithaca
Austin Hiram Smith	Kalamazoo
Beatrice Erdine Smith	Detroit
Bertram David Smith	Detroit
Carl Henry Smith	Bay City
Carrie Cecelia Smith	Marion, Ind.
Clement Andrew Smith	Ann Arbor
Clifford Richard Smith	Detroit
Colton Slaymaker Smith	Ishpeming
Constance Alison Smith	Ann Arbor
Dora Marie Smith	Adrian
Elise Bennett Smith	Louisville, Ky.
Elizabeth Josephine Smith	Ann Arbor
Elizabeth Taylor Smith	Wyandotte
Elwyn Leslie Smith	Adrian
Francis McGregor Smith	Lexington, Ky.
Frederic Latta Smith	Detroit
Grant Alexander Smith	St. Clair
Harriet Large Smith	Rydal, Pa.
Hazel May Smith	Marquette
Hugh Thompson Smith	Jackson
Janet Smith	Dowagiac
John Harold Smith	Detroit
Katherine Elizabeth Smith	Plainwell
Katherine Marie Smith	Grand Rapids
†Kenneth Clyde Smith, *e*	Euclid, Ohio
Kenneth Monroe Smith	East Liverpool, Ohio
Lillia Luella Smith	Byron, Ill.
Leon Clother Smith	Ogden, Utah
Morris Abram Smith	Weston
Olive Nellie Smith	Detroit
†Patrick John Smith, *e*	Glouster, Ohio
Ralph Lowes Smith	Grand Rapids
Raymond Havens Smith	Detroit
Raymond Vincent Smith	Paxton, Ill.
Russell Warren Smith, *l*	LaPorte, Ind.
Sara Minerva Smith	Detroit
Stewart Smith	Hammond, Ind.
Susan Margaret Smith	Toledo, Ohio
Thelma Leone Smith	Clarence, Iowa
Virginia Alexander Smith	Detroit
†William Earl Smith, *e*	Rochester, N. Y.
Wessel Smitter	Grand Rapids
Marjorie Snavely	Ironwood
Lawrence Wordsworth Snell, Jr.	Detroit
Beatrice Ada Snider	Ann Arbor
Robert Richard Snodgrass	Franklin, Kans.
Marjorie Mable Snover	Bay City
†Leroy Grant Snow, *g*	Cheyenne, Wyo.
Frederick Russell Snyder	Detroit
Katharine Uhl Snyder	Somerset, Pa.
Laura Elizabeth Snyder	Detroit
Mabel Eleanor Snyder	Detroit
Rita Frances Snyder	Rockport, Ind.
Roscoe Howe Snyder	Bay City
Ruth. Helen Snyder	Cleveland, Ohio
Dorothy Sober	Detroit
Raymond Ulysses Soddy	Calumet

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Emil Alfred Soderman	Crystal Falls
Bess Gertrude Solar	Detroit
Anna Ruth Solomon	Glennie
Stanley Edward Somers	Detroit
Robert Hahn Sonneborn	Puebla, Colo.
†Malcolm Herman Soule, *g*	Albion, N. Y.
Orville McKinley Southard	Hollandsburg, Ohio
Ruth Lenore Southerton	Battle Creek
Dorothy Trethewey Southgate	Algona, Iowa
†Frederick William Sovereign, *e*	Port Huron
Mary Anita Sower	Frankfort, Ky.
John Albert Spaeder	Erie, Pa.
Katharine Eleanor Spaford	Manchester
Margaret Louise Spalding	Detroit
Proctor Spalding	Detroit
Roscoe Torry Spannagel	Tacoma, Wash.
Rena Florence Spathelf	Ann Arbor
Dorothy Jane Spaulding	Ionia
Marion Clara Spaulding	Ionia
Edith Lynne Chubb Spaulding	Ann Arbor
Virginia Marguerite Spaulding	Cleveland, Ohio
Frances Margaret Speaker	Richmond, Ill.
George Northrop Spear	Marquette
Philip Bennett Spear, Jr.	Marquette
Alfred William Speer	Caldwell, N. J.
Paul Dee Speer	LaGrange, Ill.
Francis Coppins Spence	Detroit
Henry Wibirt Spence, Jr.	Detroit
Arthur Everett Spencer, Jr.	Joplin, Mo.
Eleanor Cunningham Spencer	Muncie, Ind.
Marshall Dean Spencer	Lawton
Donald Liskow Sperry	Saginaw
†Clifford Henry Spicer, *e*	Rushton
Wilbur Dale Spidel	Versailles, Ohio
Jessie Louvern Spiker	Clarksburg, W. Va.
Harold Stephen Spitler	VanBuren, Ohio
Sherman Tefft Spitzer	Oak Park, Ill.
Doris McNeil Sprague	Cheboygan
Ella von Sprecken	Ludington
Helen Ann Sprick	Quincy, Ill.
Frederick Christian Spring	Ann Arbor
Genevieve Adelaide Sproat	Ionia
Richard Greig Sprunk	Detroit
Bert Spurrier	Detroit
Gladys Stanley Squire	Huntington, W. Va.
Lyle Eli Squire	Vickeryville
Russell Luther Staats	Central City, Nebr.
William Lewis Stadler	Lima, Ohio
Joseph Randolph Stadtfield	Pittsburgh, Pa.
Edith Alice Staebler	Ann Arbor
Hester Amelia Staff	Royal Oak
Catherine Josephine Stafford	New York, N. Y.
Harold Ellicott Stafford	Oak Park, Ill.
Marion Barber Stahl	West Point, Nebr.
Lyle Curtis Stainfield	Joliet, Ill.
George Hendrickson Stalker	Ann Arbor
Walden Frederick Stamm	Strongsville, Ohio
Harry Franck Stamos	Canajoharie, N. Y.
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Stuart Standish	Oak Park, Ill.
†Clarence Leon Stanley, *e*	Detroit
Charles Frederic Stanton	Royal Oak

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Helen Pauline Starr	Grass Lake
James Allison Starr	Harbor Springs
Katherine Louise Starr	Corry, Pa.
Lodge DuBois Staubach	Glen Ridge, N. J.
Frederick M. Staudaker	Dillon, Mont.
Mary Elizabeth Stauffer	Willow Street, Pa.
Harold Edwin Stedman	Battle Creek
Joyce Merrill Stedman	Detroit
Arthur Harvey Steele	Ann Arbor
Eleanor Harvey Steele	Ann Arbor
Dora Irene Stein	Harbor Springs
Richard Clarence Stein	Mount Carmel, Ill.
Sylvia Stein	Brooklyn, N. Y.
Morton Haskell Steinberg	Traverse City
Devera Steinberg	Traverse City
Philip Godfrey Steiner	Cincinnati, Ohio
Gerald Herman Steinke	Hastings
Donald Walton Steketee	Grand Rapids
Frank Wallder Steketee	Grand Rapids
Chester Ernest Stellhorn	Ann Arbor
Ruth Christine Stellhorn	Ann Arbor
Floyd Lewis Stelter	Bridgman
Walter Stentzel	Greenville, Ohio
Harold Merton Stephen	Vassar
John Logan Stephens	Coffeyville, Kans.
Catherine Elizabeth Stephenson	Escanaba
Eleanor Stephenson	South Bend, Ind.
Walter Leslie Stephenson	Enid, Okla.
Joe C. Sterling	Monroe
Selma Stern	Wilmington, Del.
Clark Harold Stevens	Buffalo, N. Y.
Edna Althea Stevens	Oak Park, Ill.
Elsie Laura Mary Stevens	Springfield, Ill.
Frances Olive Eleanor Stevens	Detroit
James Curtis Stevens	Munhall, Pa.
Maxine Ruth Stevens	Ann Arbor
Russell Alfred Stevens	Hartford, Conn.
Russell Eugene Stevens	Fennville
Thaddeus Southwick Stevens	Springfield, Ill.
Thelma Elizabeth Stevenson	South Haven
Edwin Poe Stewart	Lakeland, Fla.
Frances Katherine Stewart	Ann Arbor
Gilbert Ireland Stewart	Harrisburg, Pa.
John Alexander Stewart	Ann Arbor
William Huron Stewart	Montpelier, Ohio
Edward Thomas Stibich	Johnstown, Pa.
Mabel May Stickle	Three Oaks
†Frank Stiles, *e*	Battle Creek
Ernest Arvin Stiller	Florence, Kans.
Ruth Margaret Stiller	Ann Arbor
Howard Sumner Stimpson	Holyoke, Mass.
Elizabeth Scarborough Stimson	Ann Arbor
Willis David Stinson	Carmi, Ill.
Nathan Stix	Cincinnati, Ohio
Cora Leah Stobie	Ypsilanti
Nellie Stobie	Ypsilanti
Harold Thompson Stock	Detroit

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Weston Lee Stoddard	Ann Arbor
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Lorene Lee Stokes	Rochester, Minn.
Lauren Barnard Stokesberry	Indianapolis, Ind.
Adonald John Stoll	Alpena
Arthur Elwood Stone	Hopwood, Pa.
Dale Albert Stone	Kalamazoo
George Farnam Stone	Saginaw
George Luther Stone	Saginaw
Margaret Remington Stone	Cleveland, Ohio
Maxwell Earle Stone	Fenton
Edith Theresa Stoneburner	Wyandotte
Lewis Harlan Stoneman	Ann Arbor
Hazel Irene Storz	Royal Oak
Helen Adah Stoughton	Petoskey
George Adam Stracke	Detroit
Val Franklin Strahan	Detroit
Aerial Estelle Stranahan	Flushing
Martin Francis Stranz	South Bend, Ind.
Dewey Edward Strasburg	Lima, Ohio
Gertrude Stratbucker	Omaha, Nebr.
Joseph Gregory Straus, Jr.	Chicago, Ill.
Sadye Gladys Strauss	Denver, Colo.
Henry David Stricker	Detroit
Gladys Mae Strickland	Battle Creek
Willard Guilbert Strickland	Hart
Elwyn Clair Stringer	Ann Arbor
Mabel Olive Strong	Hancock
Clifton Stroud	Fenton
Sydney Harold Stroud	Detroit
Edwin Fisher Struble	Sandusky, Ohio
Marjory Maud Struble	Detroit
Clifford Ward Stuart	Chesaning
Freda Nina Stuart	Detroit
Jeanette Dunster Studley	Grand Rapids
Lillian Sommers Studness	Grand Rapids
Marie Eunice Stuefer	Grand Rapids
Ella Jay Sturgell	Ashland, Ky.
Carl Hill Sturmer	Port Huron
Ruth Helen Sturmer	Port Huron
Burton Fead Sturtridge	Croswell
Kathryn Muriel Sturtz	Iron Mountain
Oscar Muse Styron	Washington, D. C.
Shuk Suho	Detroit
Frederic William Sullivan	Detroit
Marie Rose Sullivan	Chicago, Ill.
Philip Beach Sullivan	Detroit
Virginia Winifred Sullivan	Detroit
Alfred Downing Summers	Ossian, Ind.
Bertral Summers	Port Huron
Marion Summers	Glenville, W. Va.
Quinneth Chadbourne Summers	Port Huron
Allan Boulter Sunderland	Kansas City, Mo.
Richard Benjamin Sunderman	New Bremen, Ohio
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Donald Campbell Sutherland	Waterbury, Conn.
Ruth Shirley Sutherland	Detroit
William Robert Sutherland	Vassar
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Ernest Selva Swanson	Ravenna, Ohio
Harold Theodore Swanson	Falconer, N. Y.
Vernon Leonard Swanson	Oak Park, Ill.
Katharine Esther Swayze	Kalamazoo
Jay Patrick Sweeney	Brant
George Richard Sweet	Battle Creek
Lucien Frederick Sweet	Dowagiac
Marjorie Florence Sweet	Dowagiac
Wendall Holmes Sweet	Ashtabula, Ohio
Noble Henry Swenson	Gladstone
Harold Frederic Swick	Detroit
Archie Leroy Swift	Shenandoah, Iowa
Karl Leroy Swift	Detroit
LeRoy Ernest Swift	Detroit
Edward James Swink	Detroit
Marion Ruth Sykes	Ann Arbor
Donalee Levi Tabern	Detroit
Arthur Edward Taft	Ann Arbor
Chester Archibald Taft	Hollywood, Calif.
Kenneth Edwin Taft	Canisteo, N. Y.
John Cannon Taggart, Jr.	New Castle, Pa.
Thomas Tsunezo Tanaka	Tokyo, Japan
Marion Elizabeth Tanner	Detroit
Robert Razey Tanner	Corning, N. Y.
Virginia Scott Tanner	Jackson
Adele Shirley Tappan	Niles
Gordon Eugene Tappan	Port Huron
Robert Blair Tarr	Greensburg, Pa.
Averill Claudius Tatlock	Kansas City, Mo.
Cyrus Nils Tavares	Paia, Hawaii
Mildred May Tayler	Detroit
Arthur Hurd Taylor	Boulder, Mont.
†Gale Wirt Taylor, *e*	Chelsea
Harold Albert Taylor	Flint
Howard Francis Taylor	Macy, Ind.
Irma Harriet Taylor	New Berlin, Ill.
Ival Mae Taylor	Tulsa, Okla.
Marion Frances Taylor	Detroit
Onnolee Miller Taylor	Romulus
Ross Taylor	Detroit
Ross Louis Taylor	Battle Creek
Theresa Byrne Taylor	Grand Rapids
William Jennings Taylor	Bessemer
Cassius Homer Teague	Ann Arbor
Gladys Teggerdine	Clarkston
Oscar Sarzola Tellez	Mollendo, Peru
Frederic George Telmos	Saginaw
Frank Lee Tennent	Sturgis
Clarence Davis Terrell	Oneida, N. Y.
Alfred Sumner Terry	Detroit
Charles Chapin Terry	South Bend, Ind.
Floyd Myron Tesnon	Akron, N. Y.
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Edwin Luther Theurer	Ann Arbor
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Arthur DeLong Thomas	Ypsilanti
Berneth Scott Thomas	Kalamazoo
Dorothy Thomas	Detroit
Frances Minerva Thomas	Constantine
Francis Bundy Thomas	Cincinnati, Ohio
Henry Thomas	Oklahoma City, Okla.
Henry Everett Thomas	Constantine
Jean Andrew Thomas	Detroit
Jerome Gale Thomas	Detroit
John Shepard Thomas	Detroit
Lauree Myles Thomas	Ann Arbor
Laurence Meyrick Thomas	Ypsilanti
Melvin Gale Thomas	Plymouth, Ind.
Russell Thomas	Glen Lyon, Pa.
Agnes Lemoine Thompson	Ann Arbor
Bradley Lind Thompson	Detroit
Edith Darling Thompson	Chicago, Ill.
Esten Josephine Thompson	Holliday's Cove, W. Va.
Florence Olive Thompson	Williamston
Kenneth Lloyd Thompson	Youngstown, Ohio
Wallace Bradford Thompson	Iron Mountain
John Herbert Thomson	Detroit
Lloyd Thomson	Mount Vernon, Ind.
Harry Darvin Thorn	Reading, Pa.
Russell Alger Thornquist	Grand Rapids
Donald James Thorp	Ann Arbor
Helen Townsend Thorpe	Lansing
Clarence George Thorson	Gladstone
John Ami Throp	Big Rapids
Margaret Elliott Tibbals	Detroit
Henry Bradford Tibbitts	Kirkwood, Mo.
Marcus Baker Tidey	Grand Rapids
Virgil Slack Tilly	Pryor, Okla.
Howard Slocum Tilton	Long Branch, N. J.
John Malcolm Tindal	Muncie, Ind.
Dean William Titus	Lansing
Rose Winifred Tobias	Oklahoma City, Okla.
Walter Raymond Tobin	Detroit
Hans Willis Tobler	Traverse City
Charles Kelsey Todd	Dalhart, Texas
Frances Beatrice Todd	Ann Arbor
Margaret Julia Todd	LaMesa, Calif.
Margaret Ellen Toft	Port Huron
Alfred Ernest Owen Tomlinson	Jamaica, B. W. I.
William Joseph Tomsicek	LaCrosse, Wis.
Thomas Raymond Toolan	Rochester, N. Y.
Ernest Clarence Toomey	Marenisco
Harold Toplon	Hubbell
Helene Adelia Torrey	Dowagiac
James Kent Torrey	Dowagiac
Lyle Blair Torrey	Dowagiac
Robert Chester Toutloff	Ironwood
Claude Frederick Towar	Detroit
George Tyler Townley	Ann Arbor
Bernice Ethel Townsend	Detroit
Elsie White Townsend	Waterbury, Conn.
Russell Barry Townsend	Missoula, Mont.
Harriet Felice Towsley	Midland
William Toy	National Mine
Frances Isabel Tracy	Ann Arbor

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Richard Churchill Travis	LaPorte, Ind.
Maude Murial Trebilcock	Ishpeming
Merle Markert Trebilcock	Ishpeming
John McWhinney Treble	Detroit
Dorothy Forman Trevor	Detroit
Mildred Ruth Trick	Benton Harbor
Josephine Elizabeth Triplett	Hillsdale
Arthur Edward Trippensee	Lockport, N. Y.
Joseph Jerome Trombley, Jr.	New Baltimore
George Wilbur Troost	Niles
Geraldine Margaret Troy	Grand Rapids
Mystia Nafeesia Trubey	Coldwater
Alfred Bernard Trudeau	Greenland
James John Trudell	Detroit
Dorothy True	Detroit
George Oliver True, *l*	Port Clinton, Ohio
Marion True	Detroit
Walter James Truettner	Bessemer
†Arthur Russell Truscott, *e*	Hancock
Thomas Cecil Truss	Brantford, Ont.
Virginia Vaughn Tryon	Fullerton, Calif.
Chang Ru Tsai	Soochow, China
Gerald Howe Tsai	Nanchang, China
Chih Cheng Tsao	Peking, China
Zok Tsung Tsao	Peking, China
Robert Henri Tschumy	Fremont, Ohio
Tsung-Yen Tsou	Tientsin, China
Lan-tsung Tsu, *m*	Shanghai, China
Chih-Hsin Tsung	Hankow, China
Harlow Orcutt Tubbs	Ann Arbor
Robert Speer Tubbs	Andover, N. Y.
Anthony Carter Tucker	Concord
Alice Louise Tuger	Ann Arbor
Florence Beverly Tulledge	Frankfort
Karl Nye Tunnicliffe	Ann Arbor
Vincent Joseph Turcotte	Mount Clemens
Gladys Adele Turnbull	Sarnia, Ont.
Alfred Edward Turner	Detroit
Arthur Ray Turner	Ann Arbor
Eleanor Francis Turner	Cleveland, Ohio
Gerald Lee Turner	Romeo
†Joseph Wren Turner, *g*	Lyons, N. Y.
Lewis McDonald Turner	Heyworth, Ill.
William Herbert Turner	Evart
George Washington Tustison	Saint Joe, Ind.
George Albert Tuttle, Jr.	Palmyra, N. Y.
Harley M. Tuttle	Hartford
Warren Wiseman Tuttle	Topeka, Kans.
Samuel Arthur Twersky	Detroit
Herbert Hill Twining	Ann Arbor
†Howell Newbold Tyson, Jr., *e*	Evanston, Ill.
Esther Laura Uddenberg	Skanee
Dorothy Florence Ulbright	Benton Harbor
Harold Percy Ullman	Chicago, Ill.
Joseph Ullman	Cincinnati, Ohio

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Nels Arnold Ulseth	Detroit
Arlene May Underwood	Ann Arbor
Thomas Ingle Underwood, *l*	Ann Arbor
Ellah Adele Unger	Iron Mountain
Ruth Shirley Unger	Cleveland, Ohio
James Robert Upjohn	Kalamazoo
Edward Thomas Usher	Toledo, Ohio
Irwin Charles Uteritz	Oak Park, Ill.
Tennie Elizabeth Vaden	Sherman, Tex.
Charles Alton Vail	Middletown, N. Y.
George Mosher Vail	Lansing
William Alonzo Vail	Springville, N. Y.
John Sherburne Valentine	Lexington, Mass.
Mildred Aileen Valentine	Toledo, Ohio
William Charles Valentine	Terre Haute, Ind.
Frank Casper Valvo	Forestville, N. Y.
Addison Dunbar Van Aken	Holland, Ohio
John Schermerhorn Van Alstyne	Detroit
Mary Joyce Van Alstyne	Wyandotte
Hazel Vanatta	Aledo, Ill.
Nina Vanatta	Aledo, Ill.
Chiles Bishop Van Antwerp	Farmers, Ky.
Leonard Charles Van Boven	Grand Rapids
Peter John Van Boven	Grand Rapids
Martin George Van Buren	Fowlerville
Mildred Grace Van Camp	Pontiac
Harry Vander Kamp	Holland
John W. Vanderwilt	Oskaloosa, Iowa
Dorothy Van Deursen	Dolton, Ill.
Horace Parks Vandeventer	Mount Sterling, Ill.
Jacob VandeVisse	Grand Rapids
Howard William Vandewater	Palmyra, N. Y.
Arthur Van Dusen, II.	Holland
Bruce Buick Van Dusen	Detroit
Marion Maurice Van Every	Petoskey
Carrie Elizabeth Van Horn	Otsego
Donald Howell Van Horn	Elmira, N. Y.
Earl Russell Van Luren	Erie, Pa.
†Frank John Lewis Van Natta, *e*	Erie, Pa.
Marion Elizabeth Van Ness	Chicago, Ill.
William Joseph Van Orden	Ann Arbor
Frank Van Schoick, *h*	Ann Arbor
Lalah Ellen Van Sickle	Ann Arbor
Wilbert Leslie Van Sickle	Barryton
Robert Donald Van Stone	Pontiac
Marion Brown Van Valin	Parma
Jeptha Wade Van Valkenburg	Tipton
Daniel Van Woerskom	Grand Haven
Joseph Adolph Vaselak	Bessemer
Walter Hippen Velde	Pekin, Ill.
Clarence Leon Veness	Almont
Louis Arthur Verduin	Grand Haven
Henry Arthur Vick	Toledo, Ohio
Elizabeth Vickery	Evansville, Ind.
Iris Videan	Detroit
Henry Max Vielmetti	Norway
Madeleine Mary Vinapal	Youngstown, Ohio
Beatrice Anna Vincent	Detroit
Bernice Kathlyne Vincent	Detroit
John Gerald Vinkemulder	Grand Rapids
Margaret Eugenia Vinton	Springfield, Mo.
†Howard August Visel, *e*	Bronson

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Gray Vogelsang	Grand Rapids
Daniel Fessler Vollmer	Harrisburg, Pa.
Ernest Robert Vollwiler	Caledonia
Victor James Voorheis	Harbor Springs
Marion Eleanor Vosburgh	Voorheesville, N. Y.
Edna Field Vosper	Toledo, Ohio
Louis Onisim Voss	Highland Park
Harold Louis Votey	Ada
Helen CeCeal Vowles	Mount Pleasant
Betha Waber	Mesick
William Wachs	Detroit
Jason Lloyd Wade	Chrisman, Ill.
Esther Marion Wadsworth	Otsego
William Horace Waggoner	Ravenna, Ohio
Anthony Henry Wagner	Dearborn
Barbara Wagner	Terre Haute, Ind.
Herbert Phillip Wagner	Essexville
Merry Christine Wagner	Ionia
Mary Blough Wagner	Philadelphia, Pa.
Natalie Wagner	Bessemer
Pauline Grant Waite	Ann Arbor
Juanita Bozarth Waits	Ludington
Cornell Walbridge	Toledo, Ohio
Charles Kirscheloe Walden	Joplin, Mo.
Mawry Waldhorn	Detroit
Josephine Hodges Waldo	Riverside, Ill.
George Howard Waldock	Sandusky, Ohio
Helen Josephine Waldron	Corning, N. Y.
Walter Oscar Walford	Flint
Frederick Walkem	Niagara Falls, N. Y.
Egbert Hamilton Walker	Fargo, N. Dak.
Harry Edward Walker	Ann Arbor
Harry James Walker, Jr.	Chicago, Ill.
Henry Hammersly Walker	Fargo, N. Dak.
Lucilla Asbury Walker	Fargo, N. Dak.
Margaret Alice Walker	Detroit
Marguerite Mae Walker	Dryden
Marion Lucile Walker	Detroit
Roger Venning Walker	Detroit
Ruby Clare Walker	Grand Rapids
Lyndly Andrus Walkling	Merrill
August Stanley Walkowski	Bessemer
Stanley Ellis Wall	Lansing
Glenn Oren Wallace	Tulsa, Okla.
Homer Houston Wallace	Clinton, Tenn.
Jean Angela Wallace	Grand Rapids
Lucile Mabel Wallace	Fowlerville
David Angus Waller	Kokomo, Ind.
Sara May Waller	Philadelphia, Pa.
Chadbourne Munroe Wallin	Lewiston, Mont.
Gilbert Norman Walper	Riga
Gretchen Walser	Ann Arbor
Howard Carlton Walser, *m*	Bluffton, Ind.
Martin Chinques Walt	Millet Center, Mo.
Eppie Middlemiss Walter	Detroit
John Lorenzo Walter	Evanston, Ill.
Josephine Eleanor Walter	Clarkston
Carol Vaughan Walters	Pontiac
William Robert Walton	Mishawaka, Ind.
Daniel Conrad Walz	Wayne
†Chao Fan Wang, *g*	Mukden, China

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Ethel Leota Ward	Freeland
Helen Beatrice Ward	Munger
Ivan Harold Ware	Washington
Robert Hayden Ware	Kansas City, Mo.
Frederick Leslie Warfel	Ansonia, Conn.
Bryan Warman	Ann Arbor
Vonda Marie Warman	Ann Arbor
Chester John Warncke	Detroit
Beulah Laura Warner	Ann Arbor
Harold Herrick Warner	St. Johns
Wilhelmina E. Warner	Jackson
Clarke Russell Warren	Oak Park, Ill.
Hugh Warren	Kansas City, Mo.
†John Cushing Warren, *ea*	Dowagiac
John Noble Warren	Rapid City, S. Dak.
Louise Warren	Three Oaks
Marguerite Isabel Warren	Steubenville, Ohio
Berenice Mae Warsaw	Grand Rapids
Aldred Scott Warthin, Jr.	Ann Arbor
Margaret Warthin	Ann Arbor
Edward Roger Washburn	Decatur
Anthony Vincent Washkewich	Newark, N. J.
Elisabeth Parker Wason	Pittsburgh, Pa.
John Wilson Watchpocket	Pontiac
Jean Margaret Waterbury	Detroit
Caroline Martha Waterman	Wheaton, Ill.
Frederick Bernard Waters	Benzonia
George William Waters	Bessemer
Leland Leslie Waters	Lincoln, Nebr.
Isabel Prime Waterworth	Detroit
Elizabeth Jean Watkins	Ann Arbor
Ruth Ann Watkins	Kansas City, Mo.
*Bayard Tippett Watson	Toledo, Ohio
Benjamin Frankland Watson	Ann Arbor
Drage Herring Watson	Corunna
George William Watson, *l*	Ann Arbor
John Campbell Watson	Cleveland, Ohio
Ralph Emerson Watt	Detroit
Marie Elizabeth Watters	Montpelier, Ohio
Edward Sayle Watterson	Dayton, Ohio
David Schell Watterworth	Port Huron
†David Alden Watts, *g*	Ann Arbor
Mabel Arlene Watts	Alto
Prosser McKerver Watts	Adrian
Paul Emrich Watzel	Lansing
Edward Eugene Weadock	Saginaw
David Franklin Weatherby	Mansfield, Ohio
John Raymond Weaver	Harbor Springs
Frank Daniel Webb	Ypsilanti
Lawrence Adelbert Webb	Hastings
Martin Richard Webb	Ann Arbor
Raymond Lee Webb	Gregory
Francis Finch Webber	Detroit
Edith Jamie Weber	Cleveland, Ohio
Aaron Harry Webster	Detroit
Wilmer Edwin Webster	Monroeville, Ind.
Guy Grant Wedthoff	Bay City
Odillion Barrett Weed	Charlevoix
Rolland William Weed	Ann Arbor

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Lewis Edgar Wehmeyer	Quincy, Ill.
Alvin Ferdinand Weichel	Sandusky, Ohio
†Joseph Hubert Weiden, *e*	Grand Rapids
Helen Mary Weidler	South Bend, Ind.
Frances Lucille Weidman	Mount Pleasant
Joseph Bernard Weil	Cincinnati, Ohio
Lewis Philip Weil	Philadelphia, Pa.
Dorothy Gertrude Weimer	St. Albans, W. Va.
Frances Elizabeth Weimer	St. Albans, W. Va.
Carl Andrew Weinman	Steubenville, Ohio
Leopold Weinstein	Newark, N. J.
Myer C. Weinstein	Sioux City, Iowa
Clare Wesley Weir	Ligonier, Ind.
Margaret Elizabeth Weir	Indianapolis, Ind.
Minnie Bishop Weis	Sandusky, Ohio
Paul Henry Weiskopf	Pittsburgh, Pa.
Henry Leonard Weiss	Cleveland, Ohio
Howard Andrew Welch	Jackson
Howard Baird Welch	Windsor, Ont.
Wilma Elleda Welch	Jackson
Ovid Delany Welden	Advance, Ind.
Lawrence William Weller	Youngstown, Ohio
Elmer Gustav Wellin	Grand Rapids
Bessie Marie Wells	Toledo, Ohio
Helen Searls Wells	Buchanan
Mary Lucile Wells	Bay City
Minnie Elizabeth Wells	Benton Harbor
George Nathaniel Welsh	Chicago, Ill.
Everard Bertrand Welton	Chicago, Ill.
Esther Marie Welty	Nevada, Iowa
Florence Welty	Orange City, Iowa
Mary Lucile Welty	Jackson
†Arthur August Wender, *g*	Sebewaing
Archibald Gibson Wenley	Ann Arbor
Herman Wepman	Grand Rapids
Ruth Gretchen Werkheiser	Findlay, Ohio
Thekla Marie Wermuth	Fort Wayne, Ind.
Jessie May Werner	Greenville
Lloyd Allen Wertman	Flint
Walter Kenneth Wesbrook	Detroit
Ormond Skinner Wessels	Detroit
Marjorie Isabel West	Bellevue, Ohio
Russell Warren West	Howell
William Frederick West	St. Clair
Hilda Elvera Wester	Forest Lake
Helen Marjorie Westerman	Ann Arbor
George Allen Westfall	Mount Carmel, Ill.
Dorothea June Westlake	Detroit
Dorothy Arlone Westphal	Ann Arbor
†Frederick Weyand, *e*	Buffalo, N. Y.
James Saunders Whaley	Cynthiana, Ky.
Linton Erwin Whaley	Saginaw
Thomas Blackburn Wheatley	Cincinnati, Ohio
Carlton J. Wheeler	Belding
Donald Sydney Wheeler	Ypsilanti
Esther Adelpha Wheeler	Grand Rapids
Hildreth Katherine Wheeler	Ann Arbor
James Hastings Wheeler	Kalamazoo
Katherine Mae Wheeler	Saline
George Allen Whinery	Grand Rapids
Thomas Joy Whinery, *l*	Grand Rapids

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Ray Denman Whipple	Chelsea
Thaddeus Allan Whitaker	Passaic, N. J.
Gordon Ellis Whitbeck	Buffalo, N. Y.
Barbara Elizabeth Whitcher	Jackson
Carl Louis Whitchurch	Centralia, Ill.
Harold Gilbert Whitcomb	Saginaw
Lois Elisabeth Whitcomb	Seattle, Wash.
Bess Robbins White	Memphis, Tenn.
Grace Dorothy White	Detroit
Harold Cummings White	Holland
Helen Grace White	Detroit
Howell Swanton White	Ashton
John Alonzo White	Williamsburg
John Gerald White	Chicago, Ill.
Kirk Schroder White	LaCrosse, Wis.
Newman William White	Glendale, Ariz.
Virginia Villiers White	Boyne City
William Thompson White	Fort Wayne, Ind.
Albert Whitehead	Ann Arbor
Eugene Emerson Whitehill	Indianapolis, Ind.
Lucile Whitfield	Pontiac
Mac Thomas Whitfield	Pontiac
Stuart Elton Whitfield	Pontiac
Hazel Marie Whitling	Grand Rapids
Robert Clyde Whitlock	Detroit
Grant Whitman	New Haven, Conn.
Frank Thomas Whitney	Saginaw
Virginia Whitson	Enid, Okla.
Roland Ray Whittaker	Jackson
Margaret Mary Whyte	Grand Rapids
Irene Wickerham	Rockford, Ohio
Howard Wellington Wickett	Marne
Dorothy Adelaide Wickham	Lansing
Frederick Benedict Wickham	Norwalk, Ohio
Winthrop Woodward Wickham	Norwalk, Ohio
Letty Minerva Wickliffe	Ann Arbor
Bernard DuCharme Wicks	Hopkins
Clarence Huebner Wieder	Ann Arbor
Elton Ewart Wieman	Tujunga, Calif.
Robert Ferdinand Wieneke	Detroit
Gordon d'Orsay Wier	Ann Arbor
Albert Otto Wiere	Florence, Kans.
Claribel Laura Wiggins	Fenton
Faye Wight	Yale
Helen Mae Wightman	Vicksburg
Alfred Wayne Wiitanen	Mass
Albert George Dewey Wilcox	Hornell, N. Y.
Charles Lonson Wilcox	Northville
Francis Bradford Wilcox	Oak Park, Ill.
Katherine Dutton Wilcox	Detroit
Helene Henrietta Wild	Ann Arbor
Mary Elizabeth Wiley	South Haven
Phyllis Gertrude Wiley	Detroit
George William Wilhelm	Traverse City
Kenneth D. Wilkins	Ann Arbor
Robert Weymouth Wilkins	Battle Creek
Darcy Bradley Wilkinson	Grand Rapids
Guy Meeher Wilkinson	Warrensburg, N. Y.
Martin Stanley Wilkinson	New Castle, Pa.
Russell Stuart Willcox	Sparta
Absolom Hilliard Williams,	Huron, Ind.
Adelaide Elizabeth Williams	Dayton, Ky.

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Helen Gertrude Williams	Hancock
Jack Goetchins Williams	Detroit
Kenneth Williams	Chicago, Ill.
Kenneth Daniell Williams	Fort Wayne, Ind.
Lewis Ronald Williams, *l*	Huron, Ind.
Marie Regina Williams	Clinton, Iowa
Miller Williams	Detroit
Myron Stephen Williams	Laurium
Viola Marie Williams	Detroit
George Wesley Williamson, *m*	Indianapolis, Ind.
Carolyn Eleanor Willis	Washington Court House, Ohio
Marian Elizabeth Willis	Saginaw
Frances Evelin Willison	Sault Ste. Marie
Gertrude Grace Willson	Detroit
Lois Winifred Wilmot	Gladwin
Helen Wixson Wilsey	Cass City
Andrew Davis Wilson	Worton, Md.
Ben Hollway Wilson	Toledo, Ohio
Clarice Alberta Wilson	Romeo
Florence Elizabeth Wilson	Munising
George Charles Wilson	Detroit
Hannah Rebecca Wilson	Ann Arbor
Harriet Mary Wilson	Berwyn, Ill.
Hugh Edward Wilson	Grand Rapids
John Humphrey Wilson	Logansport, Ind.
Joseph Kemper Wilson	Dayton, Ohio
Kathryn Schirra Wilson	Ann Arbor
Mabel Elizabeth Wilson	Ann Arbor
Nora Wilson	Detroit
Ralph Charles Wilson	Hartleton, Pa.
Roy Russel Wilson	Ann Arbor
Ruth Irene Wilson	Ann Arbor
Winifred Sybil Wilson	Lansing
Winnie Merle Wilson	Battle Creek
Clark Milo Wimbles	Howell
Dorothy Mildred Winchell	Calgary, Alta
Edgar Bliss Winchell	Ann Arbor
Donald Bradford Wines	Howell
Harry Abraham Winkelman	Detroit
Henry Winmont (Weinberg)	Cleveland, Ohio
Abbott Louis Winograd, *m*	Nashua, N. H.
Charles Ira Winograd	Nashua, N. H.
Benjamin Wesley Winter	Detroit
Robert Kirby Winters	Ann Arbor
Emily Mitchell Wires	Herkimer, N. Y.
Arthur Michael Wirtz	Chicago, Ill.
Elias Paul Wise	Akron, Ohio
Harold Arlington Wise	Marion, Ohio
William Howard Wise	Detroit
Frieda Hermina Wishropp	Paola, Kans.
Claude James Witherell	Chicago, Ill.
John Homer Witherspoon	Detroit
James Blass Witker	Toledo, Ohio
Edward Donald Witt	St. Joseph
Lela May Witter	Detroit
Irving Witty	New York, N. Y.
Walter Edward Wobrock, *l*	Detroit

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Hedwig Wolczynski	Detroit
Sophia Marie Wolczynski	Detroit
Helen Diana Miller Wolf	Rockwood, Pa.
Stuart Eldridge Wolf	Lakewood, Ohio
Bryan Arnell Wolfe	Hastings
Charles Henry Wolfe	Port Clinton, Ohio
James Daniel Wolfe	Bradford, Pa.
Townsend Harold Wolfe	Ann Arbor
Alvin Wolfson	Mount Clemens
Isabel Meta Wolfstein	Cincinnati, Ohio
George Wolinitz	Bayonne, N. J.
Edna Grace Wonderlic	Saginaw
Ellen Pauline Wondero	Mount Clemens
Constance Wood	Detroit
David Henry Wood	Romulus
Dorothy Jane Wood	Ann Arbor
Gerald Sterling Wood	Decatur
Grace Mae Wood	Munising
Harold Arthur Wood	Muskegon
Helen Scott Wood	Kenova, W. Va.
John Frank Wood	Ann Arbor
Mary Prettyman Wood	Springfield, Ill.
Maurice Ward Wood	Grand Rapids
Nellie Coultice Wood	Kenova, W. Va.
Nora L. Wood	Romulus
Ruth Elizabeth Wood	Bloomington, Ill.
Bernice Marguerite Woodbeck	Ann Arbor
Harry Stevens Woodford	Goshen, Ind.
Ralph Emerson Woodley	Marion, Ill.
Wallace Arden Woodlock	Pentwater
Marian Alice Woodmansee	Maywood, Ill.
Henry Willard Woodruff	St. Johns
Lee Mackie Woodruff	Grand Rapids
Joseph M. Woodward	Leetonia, Ohio
Kathryn Woodward	Coldwater
Fred Woodworth, Jr	Kansas City, Mo.
Leilla May Woodworth	Tulsa, Okla.
Harold Morris Wooton	Kalamazoo
Frederick Leas Worcester	Manila, P. I.
Tryphosa Rosalette Worcester	Manchester, N. H.
Gwyneth McFarland Wrentmore	Manila, P. I.
Alfred James Wright	Waynesville, Ohio
Esther Loreen Wright	Oshkosh, Wis.
Harold Milford Wright	Michigan City, Ind.
John Joseph Wright	Toledo, Ohio
Leona Francene Wright	Detroit
Lloyd David Wright	Dunkirk, N. Y.
Muriel Wright	Grand Blanc
Ralph Elliott Wright	Waynesville, Ohio
Joseph Wruble, *m*	Detroit
†Kai-Hung Wu, *g*	Canton, China
Andrew Pyl Wykkel	Kalamazoo
Dorothy Amelia Wylie	Shelby
Elizabeth Luce Wylie	Shelby
Frederick Fullerton Wynn, *l*	Sherwood, N. Dak.
Wiber William Wysong	West Alexandria, Ohio
Waldemar Henry Yaeger	Saginaw
Ray Elmer Yakes	Cass City
Jordan Yanakieff	Detroit
Stanley Gladstone Yaney	Celina, Ohio

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Forrest Irving Yeakey	Grand Rapids
Fu-Ping Yen	Hupeh, China
William Lloyd Yeo	Saginaw
Gertrude Brighton Yeomans	St. Joseph
Mary Katherine Yerex	Ann Arbor
Nellie Aletha Yerkes	Northville
Robert George Yerkes	Ann Arbor
Edward Hilton Yost	St. Louis
Harry Ernest Yost	Detroit
Mark Vreeland Yost	Trenton
Alma Electa Young	Chardon, Ohio
Floyd Eugene Young	Detroit
Frank Landon Young, Jr.	Lansing
James Boswell Young	Louisville, Ky.
Robert Olin Young	Keuka, N. Y.
Lovisa Alice Youngs	Calgary, Alta
†Wellington John Frederic Youngs, *ea*	Ann Arbor
David Chinsurk Youth	Honolulu, Hawaii
Louis Edward Yunker	Toledo, Ohio
Harry Hartman Zabel	Princeton, Ill.
Alice J. Zametkin	Jamaica, N. Y.
Rafael Luis Zamora	Aguadilla, P. R.
Rose Lucille Zanella	Norway
Bernard Stanton Zeiger	Detroit
Harry Albert Zeldes	Galesburg, Ill.
Margaret Lillian Zeller	Sault Ste. Marie
Walter Harold Zemke	Ann Arbor
Julian Leon Zemon	Detroit
Paul Ziegelbaur	New Albany, Ind.
William Edwin Ziegler, Jr.	Coffeyville, Kans.
Fred Zierer	Detroit
Mary Vivian Ziliak	Princeton, Ind.
Zelda Zeta Ziliak	Princeton, Ind.
Adele May Zimmerman	Cleveland, Ohio
Joseph Glenn Zimmerman	Traverse City
Muriel Mary Zimmerman	Ann Arbor
August Karl Zinn	Battle Creek
Bernard Frederick Zinn	Huntington, Ind.
Wilford Emile Zinsmeyer	Webster Groves, Mo.
Charles Bogardus Zipf, *m*	Freeport, Ill.
Howard Sylvester Zoll	Constantine
Howell Zook	Nappanee, Ind.
Israel Zweig	Fort Wayne, Ind.

* The following students are enrolled in regular University classes meeting in neighboring cities:

Helen Mary Abbott	Detroit
Penelope Abbott	Battle Creek
Marjorie Ableson	Detroit
Hazel Adair	Wyandotte

* The students in this list are enrolled in classes taught by members of the Faculty of the College of Literature, Science, and the Arts as sections of courses also offered by them in Ann Arbor. The requirements as to attendance, work, and examinations are the same as for students in residence. Students satisfactorily completing such courses receive, as in the Summer Session, credit certificates entitling them upon matriculation to full credit for these courses.

An italic letter following the name signifies that the student is also enrolled in another School or College of the University during the year 1920-1921 as follows: *g*, Graduate School. An italic *s* denotes that the student is also enrolled in the Summer Session of 1920.

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J. Whitney Adams	Detroit
Hattie Belle Ainslie	Detroit
Helen Frances Aldrich	Detroit
Minnie Alexander	Battle Creek
Lebern Allen	Detroit
Lottie Allen	Grand Rapids
Margaret Frances Allen	Grand Rapids
Mildred Elizabeth Allen	Detroit
Joseph Hill Allibone	Detroit
Edith Grace Anderson	Battle Creek
Hugh W. Andison	Detroit
Rose Hight Anthony	Detroit
Genevra Armentrout	Jackson
Mary F. Armstrong	Grand Rapids
William Thomas Ashdowne	Detroit
Frank Harlow Atkinson	Detroit
Harry Roy Atkinson	Battle Creek
Edith E. Austin	Jackson
Olive E. Austin	Detroit
Iva Cornell Baird	Detroit
Edith Pearl Baker	Highland Park
Henry Woodard Baker	Battle Creek
Martha Baker	Highland Park
Maude M. Balkema	Grandville
Martha White Bancker	Jackson
Laura Jenness Banghart	Battle Creek
Jennie M. Barnes	Grand Rapids
Burton Amander Barns	Detroit
Carrie E. Bartlett	Grand Rapids
Ernest Scherr Barton	Detroit
Guy Bates	Detroit
Fred Carter Baxter	Detroit
Alice Inez Beaudette	Detroit
Harriet Beebe	Jackson
Ethel C. Beecher	Grand Rapids
John Bertram Bell	Detroit
Margaret Ethel Bell	Detroit
Edith A. Benjamin	Detroit
Ethel Heywood Bennett	Jackson
Eva Tripp Bennett	Jackson
Francis Douglass Bennett	Jackson
Margaret Douglass Bennett	Jackson
William Kerwin Benson	Detroit
Lucy M. Bettes	Grand Rapids
Grace Helen Beyschlag	Detroit
Lawrence George Bickel	Detroit
Flora Rosa Bigelow	Detroit
Charles Wesley Bird	Detroit
Arthur Woodward Birdsall	Detroit
Anna Blanchard	Grand Rapids
Julia Eleanor Risdon Blanner	Detroit
Arthur Collier Bloomfield	Jackson
Kate Bloomfield	Jackson
Fred Finch Bontecou	Detroit
Mary Maud Bossardet	Detroit
John Baptiste Botz	River Rouge
Helen Margaret Bourke	Detroit
Janet Ethel Bowers	Detroit
Garner Milton Bowlby	Detroit
Marion Elizabeth Boyd	Detroit

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Flora Bronner	Grand Rapids
Florence Brothers	Grand Rapids
Mary Ellen Brown	Grand Rapids
E. Mae Browne	Detroit
Mary Alice Brownell	Detroit
Marguerite Brummeler	Grand Rapids
Jessie Irene Buchanan	Detroit
Ernestine Louise Buckley	Detroit
Daisy Buell	Detroit
Ida Mae Burt	Jackson
Helen Butterfield	Battle Creek
Mary Katherine Cahill	Highland Park
Francis G. Campbell	Jackson
Louis Cap	Detroit
Marjory Winifred Card	Detroit
Edith M. Cargill	Royal Oak
Carl Edwin Carlson	Detroit
Ruth A. Carlton	Jackson
Nita Carritte	Detroit
Mae Belle Carroll	Detroit
Lulu Myrtle Casemore	Detroit
Inez Estelle Caswell	Detroit
Lillian Mable Cavanaugh	Jackson
Martin Michael Cawley	Detroit
Arthur Benjamin Chadwick, Jr.	Detroit
Elizabeth Christophel	Grand Rapids
Clarence Winfield Christen	Detroit
Ruth Clapp	Grandville
Edwin Claus	Redford
Effie May Cleveland	Battle Creek
Bertha V. Clippinger	Detroit
Laura May Cobb	Jackson
Ruth Harriet Cobb	Jackson
William Gibson Coburn, A B.	Battle Creek
Stanley Maurice Cole	Detroit
Elizabeth Colleton	Grand Rapids
William James Collins	Detroit
Harvey Lee Comin	Highland Park
Mildred Marie Connely	Detroit
Roma Cook	Battle Creek
Elsie Evelyn Cooper	Detroit
Alphonzo M. Cotter	Detroit
Thomas Coughlan	Detroit
Joan Crandall	Highland Park
Florence Cruson	Jackson
Cordelia Creswell	Grand Rapids
Charles Henry Croom	Detroit
Ida Amelia Culver	Jackson
Peter Augustine Cummins	Detroit
Eleanor S. Currie	Birmingham
Edward Julius Dailey	Detroit
Floyd Joseph Daniels	Detroit
Besse Tohill Davis	Ecorse
Cameron McLean Davis	Detroit
Elva R. Davis	Detroit
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Grace M. Davis	Detroit

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Marie DeDien	Grand Rapids
Paul Defendini	Detroit
Jessie H. Denel	Grand Rapids
Edna Smith DeRau	Detroit
Harriet Dyckman Dewey	Detroit
Florence M. Dickerson	Detroit
Nellie Dier	Detroit
Myrtie Divine	Jackson
Walter Elma Dixon	Denton
Sophia K. Doll	Detroit
Aileen Elizabeth Donnelly	Battle Creek
Emory A. Doolittle	Detroit
Margaret Doran	Grand Rapids
William Henry Dorrance	Detroit
William Henry Dorrance, Jr.	Detroit
Harry Lawson Dowling	Detroit
Harry L. Driggs	Detroit
Dessalee Ryan Dudley	Battle Creek
William George Duncan	Highland Park
William Stephenson Duncan	Detroit
Wilma Doll Dunkin	Detroit
Amelia Philippine Durst	Detroit
Mary Eaton	Grand Rapids
Mary Elkin	Detroit
Marguerite Ellis	Grand Rapids
William Austin Ellis	Detroit
Albert Ellison	Detroit
Bernice L. Ely	Detroit
Charles Louis Erb	Detroit
Gustaf Rudolph Eriksson	Detroit
Eudora P. Estabrook	Grand Rapids
Harriet Welchli Evans	Detroit
Frank Harrison Ewing	Detroit
Grace Bannen Farnsworth	Detroit
Dulcie Dell Faulkner	Detroit
Lewis Franklin Fay	Detroit
Katherine Armedia Feeney	Detroit
Flora Agnes Fleischer	Jackson
Jennie May Fleming	Detroit
Frieda Foess	Detroit
Lucy Elizabeth Fogg	Jackson
Bess Foley	Highland Park
Isabelle Grace Fontaine	Detroit
Robert R. Forner	Detroit
Wilfrid Laurier Fraser	Detroit
John Jaycox Fredericks	Detroit
Caroline French	Grand Rapids
Fred Hiram Frost	Detroit
Amorette Fuller	Jackson
Daisy B. Fuller	Grand Rapids
Hester C. Fuller	Grand Rapids
Mattie Snow Fulton	Detroit
Eliza Ellen Fyan, A.B.	Detroit
Theodore William Gabriel	Detroit
Glen Ursa Gage	Detroit
Ethel Daisy Galloway	Detroit
Alice Garrett	Detroit

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James Thomas Gibney	Detroit
Ethel Irene Giffin	Redford
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Winifred Mary Gillis	Ecorse
Frank Henry Glantz	Detroit
Thomas Stewart Goddard	Detroit
Harriet A. Goffe	Jackson
Sara B. Goodman	Grand Rapids
Ruth Goodrich	Grand Rapids
Edith G. Goodwin	Grand Rapids
Ula Wilhelmina Grace	Detroit
Margaret B. Graham	Detroit
May Frances Graham	Detroit
Eleanor Cathcart Gray	Detroit
Annie Katherine Green	Detroit
Edna Ruth Green	Detroit
Jennie Lovan Green	Jackson
Myrtle Belle Greene	Jackson
M. Cecilia Griffin	Detroit
Frances Emily Griffith	Jackson
Emma A. Grocock	Grand Rapids
Edna Dorothy Gschwind	Detroit
Edward James Gunn	Detroit
Thomas J. Gunn	Detroit
Fred Henry Haas	Trenton
Alice Haefner	Grand Rapids
Marian Frances Haines	Detroit
Helen Elizabeth Hanley	Detroit
Alice M. Hardy	Detroit
Myrtie Mae Harriman	Detroit
Alice Vittoria Hart	Detroit
Harry Carl Hartwig	Detroit
Howard James Harvey	Detroit
Cordelia Hayes	Grand Rapids
Florence Mae Hayes	Detroit
Archie Hays	Detroit
Harriet D. Helmer	Jackson
Lauretta Minerva Hendricks	Detroit
Margaret Marie Henkel	Mount Clemens
Clesta Higgins	Grand Rapids
Etta Ernestine Higgins	Jackson
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Myrrl Clotilde Hight	Detroit
Kate De Ette Hill	Detroit
Ernst Hiller	Detroit
Zella I. Hills	Detroit
Burt Wellington Hoag	Detroit
Theda Shaw Holen	Detroit
Hugh Guy Hollenbeck	Detroit
Louise Moses Hollon	Jackson
Myrtle Holmes	Detroit
D. Ashley Hooker	Detroit
Margery Cooper Hooker	Detroit
Orianna D. Hooker	Grand Rapids
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Alma Johnson	Detroit
Beatrice Ethel Johnson	Detroit
Charles A. Johnson	River Rouge
Corinne Cecelia Johnson	Detroit
Mina E. Johnson	Detroit
Mamie Ethel Jose	Jackson
Lula W. Mann Kendall	Jackson
Lucy Amelia Kennedy	Jackson
Mary Simmons Kennedy	Detroit
William Frederick Kikhoefel	Detroit
Theresa Elizabeth Kile	Battle Creek
Arthur Joseph Kinney	Detroit
Otis Henry Kinney	Detroit
Ida Jackson Kinsman	Detroit
Martha Kirk	Detroit
Winifred Alles Kirschman	Battle Creek
Walter Roland Kitson	Detroit
Nellie Klose	Grand Rapids
Essey Armanilla Klumph	Detroit
Alma Eunice Knapp	Detroit
Margaret Knoorhuizen	Grand Rapids
Helen Kolb	Grand Rapids
Charles Kovs	Detroit
Milton Harris Kramer	Detroit
Bessie Cecelia Krasa	Detroit
Walter Frank Kurzyniec	Detroit
Bessie Frances Ladd	Detroit
Mabel Clare Ladd	Detroit
Harold Sinclair Law	Dearborn
Raymond Milne Law	Detroit
Charles Everett Lemmon	Detroit
William Norman Leppard	Detroit
Norman E. Leslie	Jackson
Helen L. Lewis	Grand Rapids
Mary Chivvis Armstrong Lewis	Detroit
Ida L. Lindsay	Detroit
Benjamin Mitchell Lister	Detroit
Agnes Long	Highland Park
Albertine Grace Loomis	Highland Park
Harriet Heywood Loomis	Jackson
Clare Rose Lorenger	Detroit
Arthur Max Ludlam	Detroit
Elsie D. Lukens	Jackson
George Harold Lundberg	Detroit
Elizabeth Lynch	Grand Rapids
Ida May Lynn	Detroit
Maud Walker McBride	Detroit
Maud McClaskee	Detroit
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Ethel Agnes McCormick	Detroit
James Joseph McCourt	Detroit
Adelia McCrea	Detroit
Benjamin Franklin McCuen	River Rouge
Kate McDonald	Detroit

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Jessamine J. McGee	Jackson
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Emalene Mae McKendrick	Detroit
Jessie C. MacKenzie	Detroit
Archibald Ross MacLaren	Detroit
Nellie MacLennon	Grand Rapids
Donald A. McLeod	Detroit
George McMillan	Detroit
Theresa McNerney	Detroit
Leroy Ellison Maes	Detroit
Kathryn Josephine Malone	Detroit
Elizabeth Nancy Maloy	Jackson
Luella R. Manley	Jackson
Louise Sabine Mans	Detroit
Anne Estelle Manson	Battle Creek
Irene Mariea Mara	Detroit
Walter G. Marburger	Battle Creek
William James Marr	Detroit
Agnes C. Marsh	Jackson
Dorothy E. Marsh	Jackson
Lottie Marsh	Grand Rapids
Clarence Reynolds Martin	Detroit
Minnie Alice Martin	Jackson
Herman John Marx	Detroit
Leta Geraldine Mason	Detroit
William Franklin Mason	Detroit
Mabel Charlotte Mathewson	Detroit
Edwin Robert Maurer	Detroit
Helen Edith May	Detroit
Hugo Adolph Meinicke	Detroit
H. Winifred Merritt	Jackson
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John Frederick Miller	Detroit
Maud Elizabeth Miller	Detroit
George Albert Milligan	Detroit
Maria Sydney Minard	Detroit
Mary Christine Miner	Detroit
Carl August Mitchell	Detroit
Hazel Hahn Mitchell	Jackson
Ivan Mitchell	Detroit
James Alexander Mitchell	Detroit
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Margaret Hazlett Moore	Detroit
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Margaret E. Munson	Jackson
Gladys Irene Nagle	Highland Park
William James Nairn	Detroit
Horace Louis Neate	Detroit
Katherine C. Nelson	Detroit
Laura Lewis Netzorg	Detroit
Rachel Lewis Netzorg	Detroit
James Francis Newell, *e*	Detroit

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Georgia Anna Odell	Detroit
Carl Frederic Odgers	Detroit
Elizabeth O'Dwyer	Jackson
Margaret O'Dwyer	Jackson
Mary O'Dwyer	Jackson
Ruth O'Dwyer	Jackson
James M. Orr	Detroit
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Francis C. Osborn	Detroit
Lucile S. Otis	Detroit
Gladys Owen	Detroit
Don Carlos Pace	Detroit
June Palmerlee	Battle Creek
Claudia Mary Parker	Detroit
Flora Estelle Parker	Detroit
Amy Myra Pascoe	Detroit
Thomas Peggs	Detroit
Merrill Alonzo Perkins	Detroit
Richard Perkins	Detroit
Elizabeth Julia Perrot	Jackson
Daisy Perschbecher	Grand Rapids
Otto Henry Petroskey	Detroit
Low W. Phelps	Detroit
Fred John Plots	Detroit
Clara Lydia Pluddeman	Detroit
Sol Harrison Pollinger	Detroit
Charles N. Ponton	Detroit
Paul Pool	Detroit
Charlotte B. Pope	Grand Rapids
William Popham	Detroit
Loraine Poposkey	Grand Rapids
Emily Raber	Grand Rapids
Iva Radoye	Detroit
Ida M. Raine	Battle Creek
Henry L. Raisch	Detroit
Clara Ransom	Grand Rapids
Bertha A. Rathbun	Jackson
Grace Jane Rauch	Jackson
Hettie M. Raynor	Grand Rapids
Gwen Josephine Read	Detroit
Lula Adeline Reed	Jackson
Jennie Reber	Grand Rapids
Gwendolyn Isabel Reed	Detroit
Irene Reed	Jackson
William Anthony Reed	Detroit
Beatrice Mary Reilley	Highland Park
Leo Leonard Rembowski	Detroit
Minnie Beatrice Replogle	Jackson
William Reynolds	Detroit
Walter Henry Ribble	Detroit
Charles Dexter Richards	Detroit
Harold Chamberlain Richardson	Detroit
Caroline Moreland Riddle	Detroit
Cora Riggs	Grand Rapids

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Margaret Jean Robertson	Highland Park
Frances Clark Robinson	Detroit
Linda Henrietta Roemer	Jackson
Lewis Chubb Rogers	Detroit
Jesse Earl Rood	Detroit
Frederick Rossiter	Detroit
Louise Rossman	Jackson
Hannah Rourke	Detroit
Jean Rowe	Grand Rapids
J. Myrle Rowlader	Detroit
Agnes Grant Rowlands	Detroit
R. Nan Rozelle	Detroit
Marion R. Rubin	Detroit
Edith Merle Rugg	Detroit
Marie A. Ruhlman	Detroit
Earl Alfred Russell	River Rouge
Alice Saunders	Grand Rapids
Norman Herbert Saunders	Highland Park
Elizabeth Scheiffler	Jackson
Sylvia Schermerhorn	Battle Creek
Barbara O'Dwyer Schmid	Jackson
Ellen O'Dwyer Schmid	Jackson
Thomas Daniel Schmucker	Detroit
Walter Theodore Schmucker	Detroit
Richard Schneidewind	Detroit
Katherine Louise Schnoor	Detroit
Matilda Scholz	Grand Rapids
Harry Schuffman	Detroit
Ada Louise Scott	Detroit
Florine Scutt	Highland Park
Joseph Philip Selden	Detroit
Charles Sendelbach	Detroit
Welmet Senglaub	Highland Park
James Walter Sennett	Detroit
Nuta Serfling	Grand Rapids
Louis Shalla	Detroit
Watson Comly Shallcross	Detroit
William Ross Shaner	River Rouge
Caroline Shaw	Jackson
Margaret A. Shearer	Jackson
Anna Gertrude Sheply	Highland Park
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Albert Fredrick Bisson	C	Akron, Ohio
George Inglis Black, Jr.	Ch	Erie, Pa.

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Joseph Hill Black	M	Niagara Falls, N. Y.
Joe Robert Blackinton	M	Flint
Birdsal Edwin Blanchard		Bay City
Joseph Thomas Blaydon		Detroit
Leo Edward Blinzler		Buffalo, N. Y.
John Joseph Blissel	Ch	New Kensington, Pa.
Herman Henry Block	C	Saginaw
Jonas Louis Block		Buffalo, N. Y.
Willoughby Horace Blodgett	M	Detroit
Albert Bloom		Detroit
Karl Arthur Blumer		Peekskill, N. Y.
Herbert C. Bodamer		Monroe
Frederick Acton Boddy		Detroit
Leonard Boddy	Ch	Erie, Pa.
John Edwin Boice	M	Toledo, Ohio
William Burlin Boice	E	Toledo, Ohio
Joseph Francis Boiny	Ch	Kane, Pa.
Newton Hamilton Bollinger		Miami, Fla.
Seymour Van Bolton	M	New Hartford, N. Y.
Smith Bolton		Saginaw
Clarence Samuel Bond	M	Painesdale
Raymond Smith Bond	M	Holyoke, Mass.
Martin Nelson Boonstra	M	Zeeland
Joseph Samuel Borodawkin	C	Harbin, Manchuria
Earle Edgar Bortell	Ch	Harrisburg, Pa.
Alexander Stanley Boschan	M	Detroit
Carl Meeske Boswell		Muskegon
Ronald Colquhoun Boucher	M	Cheboygan
Albert Bouma	Ch	Chicago, Ill.
Frederic Peter Bouteiller		Tecumseh, Ont.
John Alexander Bowen		Grand Rapids
Ralph William Bowen	M	Elkhart, Ind.
Ray Oliver Bowman		Westernport, Md.
John Philip Boyce		Ypsilanti
Calvert Ammidown Boyd	E	Cincinnati, Ohio
James Harrington Boyd, Jr.		Toledo, Ohio
Clarence William Boydell	M	Detroit
Edgar Sly Bradley	C	Detroit
Donald Potter Brake		Fremont
John Morton Brake		Ashford, England
Bronson Brant	E	Coloma
Alvan Vinton Brashear	Ch	Marlette
Carl Robert Braun		Ann Arbor
Roger Knapp Braun	M	Ann Arbor
William McKinley Braybrooks		Lawrence
William Edward Brennan	M	Detroit
Bearl Woodlock Brenner		Youngstown, Ohio
Ralph King Brenner	E	Lancaster, Ohio
Jack Bressler		Hamtramck
Goebel Charles Bretz	M	Louisville, Ky.
Nathaniel Brewer	M	Washington, D. C.
Barnet Brezner	C	Detroit
William Arden Brice	E	Manistee
Ernest Gottfried Brick		Detroit
James Bayard Brill	C	Indianapolis, Ind.
Harry Abraham Brinker	M	Centerville
John D'Auby Briscoe		Pontiac
Dorrance Crawford Bronson	Ch	Hartford, Conn.
Harold Broock	Mar	Detroit
Frederic Albert Brossy	Aero	Detroit
Alward Embury Brown, A.B., *Albion College*	E	Coloma

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Gardner Westinghouse Brown	M	Fitchburg, Mass.
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Harry Morton Brown	E	Bath, N. Y.
John Donahue Brown	Ch	Grayling
Lewis Merwin Brown		Indianapolis, Ind.
Meyer Monroe Brown	M	Traverse City
Milford Neil Brown	E	Gladstone
Roy A. Brown		Greenville
William Alfred Brown	E	Holland
Herbert Alleyne Browne	Ch	Trenton
Merritt Bruch	C	Wilmette, Ill.
Ralph Roger Bruch	Ch	Wilmette, Ill.
Edwin Vernon Brumfiel		Toledo, Ohio
Carlton Lyman Brunt	C	Worcester, Mass.
Walter Wendell Brunt	C	Azalia
Willard George Bryant	C	Kalamazoo
Alexander Duncan Buchanan	Aero	Ann Arbor
Arthur Burris Buchanan	E	Sault Ste. Marie
Bruce Buchanan	E	Ann Arbor
Herbert Charles Bucholz	S-E	Ann Arbor
Harland H. Buck	E	Lyons
William Manley Buckley	Ch	Niagara Falls, Ont.
Roy Copley Buell	E	Ann Arbor
Edwin William Buerger		Lapeer
Harvey Edward Bumgardner	M	Highland Park
Jesse Allen Bumpus	M	Monroe
Ellwood Albert Bunting	M	Detroit
Grant Mitchell Bunting	Aero	Detroit
†Max Buntman, *a*		South Bend, Ind.
Pharo Collins Burg	C	Ann Arbor
Burt Simeon Burke	E	Ferrysburg
Edmund Eugene Burke	M	Toledo, Ohio
John Donald Burke		Bangor
Justin Aloysious Burke	E	Saginaw
Philip Merle Burnham	C	Portland, Me.
Floyd Arthur Burns	Ch	Ann Arbor
James Edward Burns	C	Washington, D. C.
George Sanford Burr	C	Plymouth
William Eben Burr		Fairfield, Conn.
Charles Russell Burrows		Staten Island, N. Y.
Victor William Bush	M	Big Rapids
Ebenezer Bushnell	Ch	Cleveland, Ohio
Bruce Arthur Butcher	M	Jackson
Harold George Butler		Ann Arbor
John Holmes Butler	Ch	Buffalo, N. Y.
†William Bernard Butler, *a*	M	Grand Rapids
Averill Everett Butterfield		Battle Creek
Allen Dewey Byers	C	Clyde, Ohio
Roberto Raul Calderon		La Paz, Bolivia
Paul Sylvester Calkins		Ann Arbor
William Arthur Camburn	Ch	Burr Oak
Gibson Miller Cameron	Mar	Waterbury, Conn.
William Ray Cameron	M	Galesburg, Ill.
Paul Mitchell Camiener	M	Detroit
Frank Elmer Camp	M	Detroit
Arthur Benton Campbell	Ch	Anaconda, Mont.
Calvin Arthur Campbell		Indian River
Oliver Francis Campbell	Ch	Levering

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Guy Henry Cannon	M	Ann Arbor
Glenn Edward Cantwell	Ch	Chesaning
Franklin C. Cappon	M	Holland
Everett Stuart Capron	C	Buffalo, N. Y.
Carl Edwin Carlson	E	Ludington
Carl Paul Carlson	E	Englewood, N. J.
Frank Henry Carlton	E	Laurium
Andrew Carnegie	M	Detroit
†Andre Augustus Carnochan, *a*	M	Buffalo, N. Y.
Claude Bennett Carpenter		Wayne
Harold Roy Carpenter	C	Benton Harbor
McKim Carpenter	C	Grand Rapids
Marvin St. Clair Carr	Ch	Ypsilanti
Paul Eugene Carrick	Mar	Charlotte
Charles Burr Carroll	M	Bronson
Alexander Edwin Carson	E	Detroit
Saul Carson	S-E	Rochester, N. Y.
William Harvey Cary		Springville
Harlow Mills Case		Benzonia
†Herbert Spaulding Case, *a*	E	Sault Ste. Marie
Robert Whitehead Case	Ch	Bowling Green, Ohio
Theodore Johnston Case	E	Ann Arbor
Armond Cassil	C	Detroit
Howard Owen Cedergreen		Anaconda, Mont.
Frank Cerveny	M	Wilmington, Ill.
Elmer Forrest Chamberlain	Ch	Port Huron
Blair Herbert Chamberlin		St. Clair
Howard Glazier Chamberlin	Ch	Calumet
Newell Kerby Chamberlin	M	Lakewood, Ohio
Willard Champe	C	Toledo, Ohio
Shur Fund Chan	C	Shanghai, China
Bruce Cooley Chandler		Glencoe, Ill.
Gerald Edwin Chapin	E	Sparta
Everett Chapman	E	Detroit
William Lewis Chapman	M	Bay City
Robert Mills Chappell		Detroit
Harold Edwin Chapple	E	Wayland
Chariton Nicola Charitonides	C	Constantinople, Turkey
William David Chase	Ch	Washington, D. C.
Eugene William Chatterton	E	Ann Arbor
Balwant Singh Chaulle		Punjab, India
Cheng-Hsien Henry Chen	Ch	Nanking, China
Wallace Ervin Cheney	M	Milwaukee, Wis.
Yook Dhi Chew	C	Oakland, Calif.
†Robert James Chick, Jr., *a*		Durand
Edgar Stanton Chipman	M	Ann Arbor
Christian Olaf Christenson	M	Detroit
Francis Griffith Christian	M	Ann Arbor
Robert Chapman Christian	C	Detroit
Wallace De Remer Christie	Mar	Sewaren, N. J.
Allen Wesley Church	M	Greenville
Theodore Wells Church		Cleveland, Ohio
George Maynard Chute	E	Toledo, Ohio
Austin Gilbert Clark	Mar	Chelsea
Charles Foster Clark		Bay City
Chester James Clark	M	Saginaw
Howard Belden Clark	Ch	Ypsilanti
Irving Bowne Clark	M	Utica, N. Y.
James Kendall Clark	M	Holland Patent, N. Y.
Lewis Lee Clark	C	Grand Haven

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Clarence Matheson Clemens		Plymouth
George Reginald Clemens	C	Plymouth
Norman Victor Clements	Aero	Grand Rapids
Arthur Emmett Coates	M	St. Louis, Mo.
James Oliver Coates		Ann Arbor
Frank Sittig Cobe		Toledo, Ohio
DeWitt Middleton Coburn	C	Watertown, N. Y.
Harold Chester Cochran		Akron, Ohio
Charles Bernard Coe, Jr.	Mar	Ann Arbor
John George Coggan	M	Detroit
Charles Dickinson Cogshall		Ann Arbor
Isadore William Cohen	C	Indianapolis, Ind.
Ralph Frederick Cohn	Ch	Omaha, Neb.
William Cullen Colburn	C	Asheville, N. C.
Bradford Claude Colcord	M	Clairton, Pa.
Herbert William Cole		Allegan
Kenneth R. Cole	M	Painesville, Ohio
Owen Albert Colegrove	M	Detroit
Clifford Miller Collier		Akron, Ohio
William Thomas Collier		Muskegon
Thomas Collins	C	Negaunee
Wallace H. Collins		Clio
Hollis Joachim Colyer	E	Scottville
Walter Ellsworth Comb	C	Sault Ste. Marie
Robert Shaw Comstock		Traverse City
Thomas Dewey Conlin	C	Crystall Falls
†Eugene Franz Conner, *a*		Lima, Ohio
George Van Amber Conover		Flint
Harold John Conroy	C	Battle Creek
Fred Oliver Cook	E	Capac
Levi Reed Cook		Bangor
Richard Marshall Cook		Hastings
Robert Cook	C	Cleveland, Ohio
Thomas Richard Cook	C	Norwalk, Ohio
Vernor Hosmer Cook	E	Ann Arbor
Wilbur Earl Cook	E	Plymouth
Howard Lee Cooper	Ch	Detroit
William Henry Cooper		Passaic, N. J.
Stanley Ford Copp		London, Ont.
Alfred Emerson Corbin	Ch	Passaic, N. J.
Frank S. Corby	M	St. Louis, Mo.
Lawrence Donald Corlett		Ann Arbor
Harold Grant Cornell	E	Sunfield
Henrique de Magalhaes Correa	C	Nictheroy, Brazil
Henry John Corsette		Olean, N. Y.
Raymond Kenneth Corwin	M	Friendship, N. Y.
Warren Goodell Coryell		Youngstown, Ohio
Nelson James Cosbey	E	Dearborn
Nelson Teixeira de Costa		Rio de Janeiro, Brazil
George Louis Cotter	M	St. Louis, Mo.
William A. Cotton, Jr.	E	Escanaba
Howard Hunt Couch	Aero	Oakland, Calif.
Frank Hugh Coughlin	C	Escanaba
A. Maywood Courtright		Paulding, Ohio
Walter Learned Couse	C	Detroit
Mark Bertram Covell, Jr.		Whitehall
Hudson Cruise Covert	Ch	Pontiac
Artemas Ward Cowing	Ch	Jackson
Russell Austin Cowles	Ch	Detroit

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Thomas Grasselli Crabbe		Cleveland, Ohio
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Lawrence Julius Crane	M	Detroit
Roland Neil Crane		Detroit
Peter Williamson Crans	E	St. Joseph
Robert Blair Crawford	Ch	Detroit
Dorman Alexander Crelly		Cleveland, Ohio
Dwight Moody Crispin	C	Detroit
Kenneth Robert Crocker		Grand Rapids
Charles Claude Cronk		Regina, Sask.
Harold Kenneth Cropsey		Troy, N. Y.
George Isaac Crossman	M	East Falls Church, Va.
†John William Croushore, *a*		Fayette City, Pa.
John Donald Cruise	C	Memphis, Tenn.
Carlton Waite Crumb		Bainbridge, N. Y.
Joseph Robert Cullinane	E	Lawrence
Grafton Eugene Culp	M	Toledo, Ohio
Dee Eugene Culver		Milan
Howard Smith Cummins	M	Toledo, Ohio
John Evans Cunningham	E	Freda
Herbert Clarence Curl		North Muskegon
Louis Botto Curran	M	Louisville, Ky.
Clifford George Currie	C	Detroit
Alfred Brundage Curtis	M	Cadillac
Ballard Dana Curtis		Detroit
Russell Greilick Curtis		Traverse City
James John Curto		Calumet
Alfred Oliphant Cuthbert	C	Ann Arbor
Frank Chatfield Cutting	Ch	Troy
Conrad Cecil Dahl		Detroit
Hugh Macaulay Dalziel	C	Buffalo, N. Y.
Naseeb Ghareeb Damoose	C	Grand Rapids
Percy Owen Danforth	Ch	Washington, D. C.
Ivan McLean Dansard	C	Monroe
Erwin Everard Darling		Orion
George Reginald Darling	C	Detroit
Edward Cobb Davidson	Mar	Bay City
†Otto Conrad Davidson, Jr., *g*	E	Iron Mountain
Wayne Kelley Davidson	E	Chicago, Ill.
Archer Loney Davis	M	Detroit
Arthur Davis	M	Hubbard Woods, Ill.
Frederick Earnest Davis	M	Detroit
Harold Wainwright Colter Davis	Ch	Port Huron
Harry Leroy Davis		Detroit
John Laroc Davis	C	Toledo, Ohio
Meyer Davis	M	Detroit
Robert Lyman Davis	M	Shelbyville, Ind.
Harvey Pollard Dawrs	M	Buffalo, N. Y.
Harrison Zac Dawson		Detroit
Walter Clark Dean	E	Albion
Clinton Hill Dearborn	M	Sacket Harbor, N. Y.
Alex Perez De Arce		Santiago, Chile
David Hatfield Decker	M	Detroit
Cornelius William De Clark		Grand Rapids
John Ward Deetrick	M	Youngstown, Ohio
George Louis De Foe		Watertown, N. Y.
Smith J. DeFrance	E	Battle Creek
Louis Charles Deising		Onekama

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Clarence Drummond De Puy		Oak Park, Ill.
Philip Welz Des Roches	M	Detroit
George Irvin Detlor	Ch	Grand Rapids
John Marcy Detwyler	M	Jackson
Luman Youngs Deuchler	Ch	Lyons, N. Y.
Segundo Aquino De Vera	M	San Nicolas, P. I.
Joseph Bradley Dewey		Monroe
Christos Demetrious Diamantopoulos		Detroit
Marion Adelbert Dibble	Ch	Adrian
Thomas Milton Dickerson	E	Slaughters, Ky.
Martin Russell Dickie	C	Indianapolis, Ind.
Joseph Earl Dickinson	E	Cass City
Norman Karl Diedrich		Petersburg
†Reimar Frederic Diekhoff, *a*	M	Ann Arbor
George John Dietle		Detroit
William Flaggert Dietrich	M	Muskegon
Roswell Passmore Dillon	Ch	Ann Arbor
Elton Mathias Discher	E	Ann Arbor
Donald McIntosh Dixon		Ann Arbor
Harrison Irving Dixon		Cleveland, Ohio
Marshall Hackney Dixon		Piedmont, W. Va.
Milton Allen Dixon	Ch	Sault Ste. Marie
Byron Phedon Djiras	M	Aix-en-Provence, France
Russell Dodd	C	Highland Park
Harland Pray Dodge	C	Whitmore Lake
Harold Dean Dollinger		Bay City
Carl Templar Doman	E	Elbridge, N. Y.
Kenneth Woodbridge Donnell	M	Ann Arbor
Llewellyn Doonan	E	Greenland
Sidney Dorb		Detroit
Louis Alexander Dorff		Grand Rapids
Wendell E. Doty		Bedford
Donald Craig Douglas	M	Ann Arbor
William Francis Douthit		Washington, D. C.
James Douglas Dow	Mar	Detroit
James Hastings Downie	M	Detroit
Harold Griffen Downs		Hastings
Charles Merritt Drake	M	Ann Arbor
Rollin Edwards Drake, Jr.	M	Ann Arbor
William Jackson Dreiss	E	Ontonagon
Ralph Nicholas DuBois	M	Washington, D. C.
Paul Duckwall, Jr.	M	Bradentown, Fla.
Wilton Robert Dudley	E	Bath, N. Y.
Karl Boller Duerr	E	Erie
James Eugene Duffy, Jr.		Bay City
Volney Lee Dunklin		Detroit
William Hill Dunster	C	St. Ignace
Ben Dushnik	Ch	Detroit
Carl Theodore Dust		Detroit
Robert Dilworth Dùy	M	Plainfield, N. J.
Clovis Evert Dyckman	M	South Haven
Robert Ellery Dyment	M	West Flamboro, Ont.
Edward Churchman Earhart	E	Ann Arbor
Eugene La Moyne Eckfield		Royal Oak
Alvan Putnam Eddy		Fredonia, N. Y.
Benjamin Hathaway Eddy	M	Ann Arbor
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Russell LaFayette Edison	M	Grand Rapids

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Edmund Kennedy Ellis	M	Washington, D. C.
Fred DeLois Ellis	E	Mount Pleasant
Clay Davis Ellison		Scranton, Pa.
Harvey Harold Elsoffer	Ch	Cleveland, Ohio
Edwin Louis Emens		Rochester, N. Y.
†Willard Hazen Emerick, *a*		Fort Wayne, Ind.
George Franklyn Emery	C	Detroit
†Lawrence Bates Emery, *a*	E	Benton Harbor
Clifford Robert Enders	E	Coloma
Helge Gustave Erickson	C	Norway
Isaac Wilmer Erickson		Atlantic Mine
Lennart Wilhelm Erickson	M	Gladstone
Raymond Lenne Erickson		Ironwood
Robert Joseph Ernst	M	Highland Park
Leslie Goodhue Estep	Ch	Detroit
Thomas Edison Eubank	C	Louisville, Ky.
Harvey Henry Eustrom	E	Grand Rapids
Albert Belknap Evans	E	Peekskill, N. Y.
Clark Evans	M	Clarks Green, Pa.
Robert Pierce Everett	M	Detroit
Roy Edward Everett	C	Jackson
Russell Eugene Eversdyk		Grand Rapids
Horace Reed Every	C	Brooklyn
Ross Fwing	E	Marquette
Richard Reed Faben		Toledo, Ohio
William Percy Failing		Grayling
Karl Joseph Fairbanks		Watertown, N. Y.
Yuan Cesar Farias		Santiago del Estero, Argentina
Charles Creel Farnam	E	Sand Lake
Charles Ernest Farrell	M	Milford
Ralph Preston Feather	E	Flint
†Howard Dietz Fellows, *a*		Lyons, N. Y.
Almon Norwood Fenton		Ann Arbor
Herbert Sidney Fenwick	C	Scotts
George Dewey Ferguson		Rochester, N. Y.
Gordon William Ferguson	Mar	Ann Arbor
Harry Weidel Ferguson		Reading, Pa.
William Theodore Ferguson	M	Paw Paw
Salvador Arceta Fernandez		Lilio, Lagura, P. I.
Lester King Ferris	M	Detroit
Arthur Stanley Fetters, Jr.		Detroit
Ossian Putman Field		Mount Vision, N. Y.
Theodore Jack Finger	C	Fort Collins, Colo.
Bernard Fink (Finkelstein)	M	Newark, N. J.
William LaVilla Fink	Ch	Detroit
Carleton Lee Finkbeiner	C	Perrysburg, Ohio
John Tooker Finley	M	Washington, D. C.
Theron Gutman Finzel	Ch	Monroe
Vance Shadley Firestone	M	Kingfisher, Okla.
George Harold Fischer	M	Saginaw
Richard Otto Fischer	M	Chicago, Ill.
Julian Alston Fisher	C	Washington, D. C.
Frederick Besancon Fisk	M	Detroit
George Walter Fiske, Jr.	M	St. Matthews, Ky.
Richard Fleming, Jr.	Ch	Martinez, Calif.
Wilmer Stuart Fleming	C	Beaver, Pa.

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Everett William Folsom	E	Detroit
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Kenneth Millman Foote		Jackson
Vernon Stuart Foote	C	Grand Rapids
George Kern Forrester	E	Pueblo, Colo.
Newton Melville Forsythe		Joplin, Mo.
John Robert Fortune, Jr.		Toledo, Ohio
Frank Plidell Foster	C	Holly
George M. Foster	C	Galien
James Oliver Foster	C	Fremont, Ohio
Leland William Fought	Ch	Oak Harbor, Ohio
William Van Cleve Foulks	E	Canton, Ohio
Elmer Bernard Fountain	C	Wyandotte
Gordon Charles Fowler		Chicago, Ill.
Edmund Hamilton Fox	E	Detroit
Einar Arthur Frandsen	Ch	Hastings
William Roberts Fraser	Ch	Newport, R. I.
William Ronald Frazer	Ch	Flint
Charles Walter Frederick	M	Detroit
Lawrence Vivian Fredlund		Iron River
Guy Carlton Freeborn		Hart
Harold Raymond Freeborn		Rochester
Robert Gibbard Freeman	M	Flint
Ronald Melville Freeman		Milan
Martin David Friedman	E	Kansas City, Mo.
Max Mark Frocht	M	Detroit
Herbert Arthur Froemming		Milwaukee, Wis.
Laurence Ewing Frost	E	Grand Rapids
Leon Earl Frost	M	Smyrna
Emmett Jay Frounfelker	M	Jackson
Harvey Edward Frye	M	Ann Arbor
Arthur Harris Gaines		Texarkana, Tex.
LeGrand Abner Gaines, Jr.	E	Texarkana, Tex.
Maximino Galarza	C	Ann Arbor
Gerald Asa Gale	E	Ypsilanti
Richard Elliott Gale	E	Albion
William Gallancy		Rochester, N. Y.
Clifford George Gallup	E	Jackson
John Tennant Garber	Ch	Essexville
Octave Desjardins Gardner		Lowell
Ralph William Garlick	Ch	Detroit
Harry Goodwin Garman	M	Detroit
Lawrence Ray Garman	M	Detroit
James Sherman Gault	E	Detroit
Andrew Joseph Gavey	Mar	Glenlyon, Pa.
Levi P. Morton Gaylor		Lyons Falls, N. Y.
Richard Charles Gazley		Elyria, Ohio
Joseph Ritner Gebhart	Ch	Dayton, Ohio
Alfred Harold Geen	Ch	St. Thomas, Ont.
Walter Daniel Geeting		West Alexandria, Ohio
Carl Ernest Gehring	S-C	Cleveland, Ohio
Howard Clifford George	E	Coldwater
Thomas Ellis Gerrie		Port Huron
Louis Gess		St. Joseph
Charles Walker Gibford	E	Adrian
Donald George Gibson		Whiting, Iowa
Stuart Beck Gibson		Detroit
Elmer John Giffels	C	St. Johns
Proctor Joseph Gilbert		Oak Park, Ill.
Warren Van Rensselaer Gilbert	M	Detroit

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Percy Howard Ging		Duluth, Minn.
Clarence Joseph Girard	Ch	Plattsburg, N. Y.
David Hasler Glass, Jr.	E	Flint
Hubert Glatte	E	Buffalo, N. Y.
Edwin Sims Gleason	C	Lansing
Roger Childs Gleason		Ann Arbor
Horace Henry Glew		Benton Harbor
George Robert Goble	M	Detroit
Gordon Fred Godley	C	Port Huron
Paul Gordon Goebel	C	Grand Rapids
Fred John Goellner		Port Gibson, N. Y.
Milton Alois Goetz	C	Sault Ste. Marie
Wilbur Elmor Goetz	M	Ann Arbor
Casimir John Gogulski	M	Grand Rapids
David Goldberg	C	Detroit
John Golder, Jr.	M	Indiana Harbor, Ind.
Edward Ralph Goldman	Ch	Port Huron
Jechiel Goldman	C	Detroit
Nahum Goldman	M	Detroit
George Morris Golds	C	Holland
Philip Harold Goldsmith	Mar	New York, N. Y.
Henry Arnold Goldwater		New York, N. Y.
Stephen William Golinski	C	Newark, N. J.
†Miles Eddowes Goll, *g*	M	Dayton, Ohio
Victor Gondes, Jr.		Reading, Pa.
Arthur John Good	Ch	Faithorn
John Everitt Good	C	Allentown, Pa.
Reginald Martin Goodenow	E	Flint
Alfred Maxwell Goodison, Jr.	E	Detroit
Ernest Albert Goodman	Ch	Grand Rapids
Henry William Goodman	E	Grand Rapids
Robert Carlyle Goodrich		St. Joseph
Eddis Julian Goodstone		Springfield, Mass.
Lloyd Emanual Gordon	Ch	Bellaire
Lynn Sherman Gordon	Ch	Detroit
John Nowak Gosinski	E	Bay City
Albert Fayette Gould		Battle Creek
Harry Gowins		Dallas, Tex.
Niles George Graden		Detroit
William Ellicott Grainger	M	Kansas City, Mo.
Alden Edward Graneggen		National Mine
Robert Alan Granger		Chicago, Ill.
Burton Eugene Grant	E	Grand Rapids
Howard Derby Grant	Ch	Ann Arbor
Joseph Albert Grant		Floreffe, Pa.
William Graulich, Jr.		Orange, N. J.
Carroll Lynn Graves	E	Ann Arbor
Charles McMillan Green	Ch	Ontonagon
Frederick Louis Green		Detroit
Maurice Warner Green	Aero	Dowagiac
Jack Greenberg	C	Grand Forks, N. Dak.
Robert Ervin Greene		Nashville
James Andrew Greenwald, Jr.		Toledo, Ohio
George Erwin Gregory	M	Corning, N. Y.
William Harold Gridley	Mar	Detroit

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William Arthur Griffin	E	Erie, Pa.
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Chester Emmel Grigsby	M	New Castle, Pa.
Robert Frederick Grindley	M	Pontiac
Tully Albert Gross	Mar	Glen Lyon, Pa.
Benjamin Edwin Groves	C	Ann Arbor
Henry George Groves		Lakota, N. Dak.
†Hermann Kerst Grunwaldt, *g*	C	Concordia, Argentina
Maurice Alfred Guenin		Saginaw
Orrin Smith Gulley	M	Detroit
Aaron Gurewitch		Detroit
Theodore Roosevelt Gustafson	M	Nahma
Arthur Neil Gustine	M	Hartford
Joseph Gwiazdowski	Ch	Toledo, Ohio
Everett Hackett	Ch	Birmingham
Stuart Joseph Hackett		Detroit
Lambert Hadley	E	Holly
Walter John Hagen		Petersburg
Edgar August Hahn		Mount Clemens
John Vincent Haidler	M	Columbia, S. C.
Harry Hurless Haight	M	Crystal Falls
Margaret Haines	AII	Kalamazoo
Rudolph Halvard Halberg		Waterbury, Conn.
Arthur George Hall	E	Ann Arbor
Cecil Gaylord Hall	E	Stockbridge
†George Alfred Hall, *a*		Holley, N. Y.
Joseph Guy Hall	C	Pengilly, Minn.
Casper Paul Haller	M	Herkimer, N. Y.
Theodore Ritson Halman	E	Detroit
Merrill Clarence Hamburg		Ann Arbor
George Howard Hamilton		Troy, N. Y.
Maurice Eugene Hammond	AE	Pontiac
Paul David Hammond	Ch	Pontiac
Tolan Adelbert Hammond	C	Grand Rapids
Edward Marks Hampton	C	Chevy Chase, D. C.
Carlton Mead Hanford	Ch	Buffalo, N. Y.
Arthur Winfield Hanigan		Detroit
John Clifford Hanna	C	Detroit
Eugene Harbeck	M	Ann Arbor
Eugene Orr Harbeck	Ch	Grand Haven
Luke Fred Harig		Cincinnati, Ohio
Kershaw Harms	Ch	Salt Lake City, Utah
William Lowell Harper		Wauseon, Ohio
George Rennels Harrington	M	St. Louis
Gordon Clifford Harris	M	East Aurora, N. Y.
Grant Harris		La Crosse, Wis.
Leroy Adell Harris	E	Decker
Oscar Bryan Harris	Aero	Modoc, Kans.
Benjamin Schofield Harrison	Ch	Ann Arbor
Charles George Harrison	M	Detroit
William Riddle Harrison	M	Massillon, Ohio
Gordon William Harry	M	Flint
Richard Lecklider Hart	M	Owosso
Wilbert Gray Hartle		Lakewood, Ohio
Frederick Wesley Hartmann	C	Grand Rapids
Alfred Lewis Harvey	M	Ypsilanti
Marvin Spears Harvey		Hillsdale
William Henry Harvie	C	Lum
Chester Winthrop Haskins	M	Detroit
William Henry Hasselbach		Toledo, Ohio

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John Donald Hauselt	M	Wellsville, N. Y.
Benjamin Franklin Hausman		Toledo, Ohio
Arian William Haven	C	Grand Rapids
Frank Pratt Haydon	E	Ypsilanti
Laughlin Thomas Hayes	M	Mount Clemens
Ronald McKean Hazen	M	Larimore, N. Dak.
James Christopher Healy	Ch	Northampton, Mass.
Guy Arthur Heard	M	Ontonagon
James Thomas Heard		Ontonagon
Lloyd William Heard	Ch	Ontonagon
John Harris Hearding	M	Duluth, Minn.
Walter Leo Hearn		Ann Arbor
Bennette Legge Heath	Ch	Warren, Pa.
George Alfred Heath	M	Toledo, Ohio
Harry Edwin Heck	C	Chicago, Ill.
Frank Gustaf Helander		Youngstown, Ohio
Elmer Runyan Helferich	M	Utica
Frederick Willard Heller		Oak Harbor, Ohio
Harold Henry Heller	Ch	Appleton, Wis.
Henry Theodore Hellmers	Ch	Lookout, Pa.
Philip Armand Henault	M	Norwich, Conn.
Clayton Warner Henderson	M	Sault Ste. Marie
Wayne Gurnee Henderson	M	Cleveland Heights, Ohio
Martin Stanton Henley	Ch	Jackson
Clyde Edward Herman	C	Kalamazoo
Newton Joseph Hermes		Huron, Ohio
Donald Frederick Herrick	E	Albion
Claude Milton Herriman		Brook, Ind.
Donald Edgar Herringshaw	Ch	Toledo, Ohio
Harry Kurtz Herschman	Ch	Washington, D. C.
George Kellogg Hess	E	Benton Harbor
William Eugene Hettrick, Jr.,	M	Toledo, Ohio
Francis Glenn Hickey	M	Middleport, N. Y.
Herbert Scoble Hicks	C	Ann Arbor
Marvel Davere Hicks	E	Ann Arbor
George Judson Higgins	Aero	Ann Arbor
Rathburn Romeyn Higgins	Ch	Granville, N. Y.
William Heiser Hilborn		New Castle, Pa.
Frederick John Hildebrandt		Huron, Ohio
Clifton Carr Hill		Templeton, Mass.
Ernal Charles Hill	M	Sault Ste. Marie
Lloyd Robert Hill	C	Avon Lake, Ohio
Myron George Hill	Ch	Cleveland, Ohio
†Warren Francis Hill, *a*	C	Marlette
William Charles Hill		Port Huron
Louis Richard Hiller	E	Dayton, Ohio
Clarence Eugene Hillier		Port Huron
John Henry Hills	M	Grand Rapids
Grace Havelock Hindshaw	Ch	Ann Arbor
Milton Gibson Hinkley	M.	Benton Harbor
Glenn Sparling Hiuser		Ann Arbor
Perry Marshall Hobbs	M	Cleveland, Ohio
Solomon Hoberman	Ch	Bayonne, N. J.
Howard George Hodge	Ch	Jackson
Robert Wendell Hodge	E	Detroit
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Harold Wesley Hoffman	S-M	Ann Arbor

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Donald August Holm		Sugar Grove, Pa.
Arthur Mudge Holmes	Ch	Detroit
Edward Dolliver Holmes	S-Aero	Havana, N. Dak.
Frank Harley Holmes	Ch	Lima, Ohio
George Arthur Holmes	M	Hamilton, Ont.
John Edward Holmes	C	Detroit
Gerald Reppy Holton	Ch	Waterloo, Iowa
Leland Wayne Holtz		Wayne, Neb.
William Henry Hooper	C	Ann Arbor
Ralph Allen Hoot	C	Big Rapids
Clarence Warren Hopkins	C	Breckenridge
Keizo Horiuchi	M	Tokyo, Japan
Frederick Albert Horn	Ch	Windsor, Ont.
Lester Adam Hornung	C	Gibsonburg, Ohio
Homer Lincoln Hosking	M	Laurium
Howard Benjamin Hostetler	E	St. Johns
Jacob Wilhelm Hostrup		Clinton, Iowa
Lawrence Sproul Houk	E	Dover, Ohio
William Stuart Housel	C	Ann Arbor
Alden Lane Howard	M	Washington, D. C.
William Herman Howard	M	Youngstown, Ohio
Alden Grenell Hoyt	E	Rochester, N. Y.
†Chi Liang Hu, *g*	C	Canton, China
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Seth Andrew Hubbard		Riverhead, N. Y.
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Victor Everett Hulett	M	Durand
Charles Louis Hulswit		Grand Rapids
Harold Dallas Humphrey	E	Bellevue, Ohio
John Warren Humphrey		Detroit
James Victor Hunn	Ch	Avoca, N. Y.
Donald William Hunter	C	Detroit
Donald Lee Hunting	M	Rockford
Albert Lord Huntington		Ann Arbor
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George Irvine Hutcheson	C	Ann Arbor
William John Hutchinson	E	Flat Rock
James Donald Hutson	M	Detroit
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David Gerard Iliff	M	Crawfordsville, Ind.
George Daniel Inskip	S-C	Ann Arbor
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William Ellis Row Irwin	C	Philadelphia, Pa.
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Samuel Curna Jacka	C	Crystal Falls
Harold Wesley Jackman	Ch	Adrian
Charles Ernest Jackson		Sturgis
James Cooper Jackson		Reading, Pa.
Edward Jacobson	Mar	Pittsburgh, Pa.
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Augustus Reinosa Jimeno	E	Buin, Chile
George Washington John		Newaygo
Victor Paul John	Mar	Louisville, Ky.
James Edward Johns	C	Lansing
Albin Leonard Johnson	M	Bay City
Clarence Holger Johnson		Iron Mountain
Edward Oscar Johnson		Negaunee
Ernest Raymond Alfred Johnson	Ch	South Bend, Ind.
George Wilfrid Johnson, Jr.	C	Mexico City, Mex.
Henry Alan Johnson	Ch	Detroit
Henry Victor Johnson	E	Mancelona
Jacob Kiehner Johnson	Ch	Lakewood, Ohio
Lloyd Johnson	Ch	Ontonagon
Neal Millard Johnson	E	Detroit
Newton Halsey Johnson	Ch	Ironton, Ohio
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Stephen Johnson, Jr.	Mar	Newport News, Va.
Walter Charles Johnson		South Bend, Ind.
West Jacob Johnson		Chicago, Ill.
Clarence Nettleton Johnston	M	Ann Arbor
Franklin Davis Johnston	E	Ann Arbor
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Charles Eugene Jordan	Ch	Bedford
Frank Milton Jordan		Detroit
Fred Burr Joslin		Big Rapids
Carl William Kalchthaler	E	Algonac
Herbert George Kamrath	M	Wells
Eli Kaplan		South Bend, Ind.
Herman Cornelius Kappler	M	Coldwater
Lall Chand Kapur	Ch	Punjab, India
Arthur Joseph Karpus	M	Bay City
David Kass		Rochester, N. Y.
Maxwell Katz	E	Rochester, N. Y.
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Morton Eisenman Katzenstein	Ch	Cleveland, Ohio
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John Wallace Kearns		Evanston, Ill.
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Philip Stevens Keeler	Ch	Saginaw
Henry Joseph Kehoe	M	Wilkes-Barre, Pa.
Theodore Henry Keidanz	Mar	New York, N. Y.
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John Robert Kelley		Richmond, Ind.
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William Worley Kerlin	Ch	Greenville, Ohio
Eric James Kermath	M	Detroit
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John Mead Kerr	M	Bay City
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Walter Herman Koepp	Ch	Marquette
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Boleslaus Peter Kolwicz	Mar	Detroit
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Richard Henry Krause		Rockford
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Frederick Richard Kretschmar		Detroit
Harold Kripke	Ch	Toledo, Ohio
Basil Raymond Kritz		Detroit
Walter Perry Kroupe	E	Cedar
Carl Martin Krueger	C	Detroit
Edwin Arthur Krueger	M	Manistee
Floyd Henry Kruger	Aero	Sturgis
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Vernon William Kuschinsk	Mar	Chicago, Ill.
Ming Tsing Kwong		Hong Kong, China
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Gayard Frank Lafer	M	Detroit
Walter Lahde		Aberdeen, Wash.
Oscar Wiles Lake		Benton Harbor
Cho-Kwan Lam	M	Hong Kong, China
Charles Jean La Marre	M	Alpena
Donald Campbell Lamb	Ch	Grand Rapids
Frank Bernard Lambert, Jr.	M	Chicago, Ill.
Laurence Glenn Lambertson	M	Belding
Richard Waldo Lambrecht	C	Detroit
James Noble Landis	M	Indianapolis, Ind.
John Ayers Lang		Detroit
Lloyd Lester Lang		Harbor Beach
Charles Williams Larrabee		Portland, Me.
Vicente Hernandez Larranaga	E	Santiago, Chile
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Jarl Evert Larson	Mar	Crystal Falls
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William Francis Laurence		Detroit
Harold Jackson Lauver	M	Detroit
George Frederick Lawley, II.		Braintree, Mass.
George Benjamin Lawrence		Chelsea
Kenneth Alton Lawrence	M	Detroit
Robert Lorenzo Lawrence	M	Chelsea
Seward Noble Lawson	Aero	Detroit
Lacy Latimer Leach	E	Canonsburg, Pa.
Hubert Samuel Leader	Ch	Grand Rapids
George Henry Le Boeuf	M	Muskegon
Alvin Porter Lee	M	Muskogee, Okla.
William Joan Lee	E	Sun Ning, China
Willis Ralph Leenhouts	Ch	Grand Rapids
Charles Baird Leeson	M	Marquette
Cecil Leet	E	Detroit
Theodore William Legatski		Alpena
William Charles Leingang	E	Chillicothe, Ohio
Francis Joseph Lennon		Cleveland, Ohio
Albert John Lent	Ch	Saginaw
Lee West Leonhard	M	Detroit
Donald Horton Lessig	C	Warsaw, Ind.
Julian Charles Lever, Jr.	M	Casper, Wyo.
Meyer Levin	C	Detroit
Leo Josef Levit	Mar	Beaufort, S. C.
Edwin Hugo Levy	Ch	Kansas City, Mo.
Samuel Carlos Lewandorf		Newark, N. J.
Alfred Raleigh Lewis, Jr.	E	Amite, La.
Dean Anderson Lewis	E	Northampton, Mass.
George Merrill Lewis	M	Ann Arbor
Henry Arnold Lewis	M	Northampton, Mass.
Robert O. Lewis	M	Flint
Sheo-Hen Li	Ch	Ihing, China
Maurice Charles Libert	M	Lewiston, Idaho
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Reginald Godfrey Lindeman	M	Grand Rapids
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Daniel Seth Ling	C	Mears
Harold Williams Lingenfelter		Indianapolis, Ind.
Ronald Curtis Linton	C	Ann Arbor
Harlow Higinbotham Lippincott	M	South Bend, Ind.
George William Lipscomb	C	Washington, D. C.
Benjamin George Lister		Detroit
George Llewellyn	M	Warren
William Semmer Lloyd		Uniontown, Pa.
Benjamin Noyes Lobdell	M	Onaway
John Ernest Lockwood	M	Ann Arbor
Max Loewensohn	C	Louisville, Ky.
Allen William Lohr	M	Washington, D. C.
James Erskine Long		Avonmore, Pa.
Durban Alfred Longenecker	M	Toledo, Ohio
Koon Chong Loo	Ch	Honolulu, Hawaii
Halbert Milton Loomis		Battle Creek
†Lloyd Albert Loomis, *a*	Ch	Detroit
Raymundo Lopez	C	Mexico City, Mex.
Kenneth McKinney Lord	C	Waverly, N. Y.
Willis Elon Losie	E	Detroit
Francis Patrick Lourim	Ch	Jackson
Elijah Parish Lovejoy	M	Princeton, Ill.
Homan Livingston Loveridge	M	Coldwater
Maurice Jay Lovin	Ch	Brooklyn, N. Y.
Stanley Tilton Lowe	Ch	Battle Creek
Percy Boyd Lowery	Ch	Owosso
John Durward Lowry	M	Ann Arbor
Clarence Edward Lucas	E	Detroit
Lester Sperry Lukins	M	Artesia, N. Mex.
Ilah Dewey Lumby	M	Pontiac
Rafael Luna		Santiago, Argentina
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William Basil Lymperis	E	Detroit
Thomas Joseph Lynch	Ch	Niagara Falls, N. Y.
Hamann Lyon	E	Ann Arbor
William Lyons	Mar	Holyoke, Mass.
Wilson Parke Lyons	C	Pontiac
Clifford Charles McArthur		Morenci
William Makey McArthur		Bay City
Mortimer Francis Macauley		Calumet
Warren Lee McCabe	Ch	Bay City
Cecil McCallum		Ann Arbor
John Carter McCalmont	Mar	Pontiac
Floyd Farren McCarty		Glouster, Ohio
George Donald McCathron		Rochester, N. Y.
Roman Albert McClatcher	Ch	Bronson
Merle Orren McClellan	Ch	Ann Arbor
Lee Stuart McClenahen	C	Wyandotte
William Allan McClenahen		Wyandotte
Paul Thompson McClurg		Akron, Ohio
George Wilfrid McCordic	E	Royal Oak
Merle Hemingway McCormack	M	Otter Lake
Samuel James McCormick	E	Courtland, Ohio
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John Wood McDonald	E	Vero, Fla.
Porter Wilson McDonnell		Erie, Pa.
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Malcolm Earl McGowan	M	Steubenville, Ohio
Robert Richmond MacGregor	Ch	Detroit
Wilfred Reid McIlveen		Detroit
William Francis McInerney		Buffalo, N. Y.
Harry John Mack		St. Johns
Thomas MacKenzie MacKay		Detroit
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Hugh Joseph McKernan		Cadillac
Walter Gilmore McKie	E	Marquette
Albert Chambers McKinley	E	Marion, Ohio
Dennis Alfred McKinney	Ch	Kalamazoo
Harris Dunbar McKinney	C	Sault Ste. Marie
Paul Fabian McKnight	Mar	Alpena
Philippus McLachlan	M	Heidelberg South Africa
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Gordon McLarty	M	Manistee
Robert Oscar William McLean		Alvinston, Ont.
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Albert MacLeod	Ch	Bay City
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Orin William McMullen	Ch	Belleville
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Harold Phenicie McNaughton	M	Coldwater
Adelbert Michael McNerney	E	Cleveland, Ohio
Paul Davis McNulty		Chicago, Ill.
Harry Jay McPherson		South Lyon
David MacTaggart, Jr.	Mar	Port Huron
John Madden	C	Chicago, Ill.
Anton George Maihofer	E	Menominee
Karl Jalmer Makinen	E	Ishpeming
Gustavo Maldanado	C	Bogota, Colombia
Frank Rexford Malleaux	E	Ann Arbor
Charles Dittrich Malloch	E	Escanaba
Edwin Lemuel Malm	M	Worcester, Mass.
Aaron Woodrooffe Manby		Niagara Falls, Ont.
John William Mangan	C	Middletown, N. Y.
Konrad Paulus Mangold		Johannesburg, South Africa
Henry Eckert Mann		Buffalo, N. Y.
Clarence Adelbert Manser		Detroit
Lowell Joseph Mantle	E	Kenova, W. Va.
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Arnold Harold Maremont		Chicago, Ill.
Axel Marin	M	Manistique
Frank Bernard Markey	S-C	Ann Arbor
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Maxwell Marks		Cincinnati, Ohio
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Stanley Sanford Marquard	M	North Muskegon
Donald Excell Marsh	M	Akron, Ohio
†Arthur Henry Marshall, *a*		Batavia, N. Y.
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Richard Bell Marshall	M	Detroit
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Wilford Arthur Mason	M	Flint
Albert Griffey Masters	E	Conneaut, Ohio
Wilbur Christy Matchett	M	Beaver, Pa.
Joseph Wilbur Mathews		Palmyra, N. J.
Leo Robert Mathews	M	Portland
Floyd D. Matthews	C	Ypsilanti
Grafton William Matthias	Ch	Ann Arbor
Waldemar Carl Mau		Fergus Falls, Minn.
Franklin Harker Maugh	C	Milford
Lawrence Carnahan Maugh	C	Milford
Robert Donald Maxwell	C	Rochester, N. Y.
Alfred Louis May	M	Detroit
Fred William Mayer		Cleveland, Ohio
Reginald Rawson Mark Mayhew		Owensboro, Ky.
Donald Edward Maytham	M	Buffalo, N. Y.
Gilbert Elton Mears	M	Detroit
Garbis Peniamin Mechigian		Detroit
Victor Meerson	E	Detroit
Will Ruthven Meese	Aero	Toledo, Ohio
Behari Lall Mehandru		Batala, India
Jal Hormasji Maneckji Mehta		Bombay, India
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John Benjamin Meister		Pettisville, Ohio
William Julius Melchers, Jr.		Owosso
Louis Mellen		Cleveland, Ohio
John B. Mellott	E	Harlan, Iowa
Frederick Edward Mengel		Toledo, Ohio
William John Menke, M		Sharon, Pa.
John Raymond Meranda	C	Richmond, Ind.
William Jasper Mergard	E	Midland
William George Merz	Ch	Berwyn, Ill.
William Solomon Meyerfeld	M	Ann Arbor
George Earl Mickle		Ann Arbor
Leigh Benjamin Middleditch	M	Ann Arbor
Keith Jenks Mihlethaler	M	Harbor Beach
Bela Jenks Mihlethaler		Harbor Beach
Harry Edward Miles	Ch	Glen Ridge, N. J.
Lester Ward Millard	C	Gladwin
Russell Algier Millard	E	Farmington
Charles Albert Miller		Marshall
Earl Spalding Miller	C	Cortland, N. Y.
Edwin Charles Miller	C	River Rouge
Eugene Harper Miller, Jr.		South Bend, Ind.
Fernand Walton Miller	C	Battle Creek
Harry Bowman Miller	M	Detroit
Harvey John Miller	M	Detroit
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Coleman Mock		Detroit
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Morris Cross Moody		Holland
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James Maxwell Moore	E	Pittsburgh, Pa.
Neil Allan Moore	Ch	Erie, Pa.
Robert Stanley Moore	Ch	Sault Ste. Marie
Walter Erwin Moore	M	Bay City
William Frederick Moore	M	Detroit
Charles Tabor Moreland	M	Adrian
Earle Lee Moreland		Jackson
Edwin Stephenson Moreland	E	Detroit
John Andrew Moreland		Buffalo, N. Y.
Sidney Howes Morgan		Battle Creek
James Currie Morrson		Ann Arbor
Joseph Charles Morris	Ch	Detroit
James Wilson Morse		Montague
Robert Lay Morse	M	Kewanee, Ill.
Axel Gunnar Mortenson	Ch	Marquette
Peter Mortenson, Jr.		Crystal Falls
Henry Jordan Morton	E	Portland, Me.
Hudson T. Morton, Jr.	Ch	Ann Arbor
Jack Leland Mosier	M	Muskogee, Okla.
Irving Brewster Moss	M	Ishpeming
Walter Webster Mott	M	Jackson
Bruce Sherman Moulton	E	Ionia
Charles Mason Mower, Jr.	C	Portland, Me.
Lowell Kendall Mower	C	Portland, Me.
Roy Dewey Bernard Moynahan	M	Detroit
Edward George Mraz	E	Chicago, Ill.
John Deming Mulford	M	Salem, Ohio
Andrew Murdock Mulholland	M	Fort Wayne, Ind.
John Lewis Munger	E	Sturgis
Donald Wright Munro	Ch	Detroit
Francis Raymond Murphy	M	Buffalo, N. Y.
Lawrence Phillip Murphy	E	Howell
Joseph Michael Murray		Rochester, N. Y.
Wesley Lavergne Murray		St. Thomas, Ont
Morris Joel Muzzy		Detroit
William Alvin Myers	Ch	Bay City
Bailey Bodwell Nagle	M	Erie, Pa.
Theodore Maxmillian Nagle	M	Erie, Pa.
William Charles Naylor	Aero	Lapeer
Robert Louis Neale	M	Union City
Harold Beverly Near	Ch	Detroit
Harold Gemmell Neelans	M	Hazardville, Conn.
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Ralph W. Newland		Benton Harbor
George Allen Newsom		Tecumseh
Dudley Newton	C	Detroit
Leo Edison Nickerson		Greenville
Albert Matthew Nicholson	M	Ironwood
Arthur Bordeaux Nicholson	C	Ann Arbor
Francis Oliver Nicklin		Franklin, Pa.
Henry Kings Nixon	Ch	Windsor, Ont.
†Walter Stanley Noa, *a*		Ludington
Francis Ignatius Nolan	E	Ann Arbor
Worthing Rexford Norton	C	Norwalk, Ohio
Jasper Manning Noyes	Ch	Jackson
Richard Arthur Nugent	Ch	Bad Axe
Thomas S. Nurnberger		Dexter
Harold Judd Nutting		Oak Park, Ill.
†Harry Randolph Oakes, *a*		Trenton, N. J.
Austin Aloysius O'Brien		Lockport, N. Y.
John Brown O'Connor	C	Port Huron
George Fred William Oehmke	M	Hamtramck
Arthur Davis Oetjen	Ch	Detroit
Edward M. O'Hara	M	Ann Arbor
John Folke Ohlson		East Orange, N. J.
James Joseph O'Kane	Ch	Ann Arbor
Eugene Webb Oldham		Petoskey
Ray Mortimer Olds	C	Grand Rapids
Richard Northcotte Olds	E	Ishpeming
†George William Oldt, *a*	Ch	Dayton, Ohio
†George Edward Oles, *g*	M	Harbor Beach
Milo Edward Oliphant		Chicago, Ill.
Merle Oliver	E	Owosso
William Albert Oliver	C	Owosso
Hildebrando Herculano de Oliveira	E	Manaus, Brazil
Harry Jay Olmstead	E	Detroit
Chauncey Emanuel Olson		Youngstown, Ohio
John Willis Oltman	M	Oberlin, Ohio
Germer James O'Mara	E	Flint
John Donald O'Meara	Mar	Seattle, Wash.
George Dean O'Neill		Ann Arbor
Lawrence Emmett O'Neill, Jr.		Emmett
Robert Edward O'Neill	Ch	Charlevoix
Edwin Manning Orr	E	Dearborn
Howard Earnest Orr	E	Rochester, N. Y.
James Jewell Orr		Royal Oak
Sady de Freitas Ortiz	M	Nonguayana, Brazil
Carl Bertram Osborne	E	Conneaut, Ohio
Leon Edwin Osmer	M	Owosso
Howard Mortimer Osmun		Allegan
James Roy Oswald	Ch	Detroit
Arthur Bacon Otis	M	Detroit
Frederick William Ott		Cleveland, Ohio
Frederick Albert Otto	Ch	Detroit
Blanton Charles Owen		Grand Rapids
Manuel Enriquez Pablo	C	Manila, P. I.
Joseph Allyn Packard	M	Chicago, Ill.
John Wallace Page	M	Adrian
Francis Irving Pahlow	Mar	Ashtabula, Ohio
Leonard Eugene Paige		Petoskey

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Gardner Ervin Palmer		Detroit
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Ralph Hobart Paquette	C	Toledo, Ohio
Reinhold Walter Paidon	Ch	Ann Arbor
Russell Horace Paris		Buffalo, N. Y.
Edward Brown Parker	M	Battle Creek
Homer Haines Parker	E	Dryden
Horace Arthur Parker		Ionia
Irving Holman Parker		Montreal, Que.
Paul Dixon Parker		Howard Lake, Minn.
Russell William Parkinson	M	Jackson
Mark Parnall	Ch	Jackson
Maynard Belden Parsons		Binghamton, N. Y.
Alfio Carl Pasini	M	Providence, R. I.
Clark H. Pasmore, A.B., *Albion College*	E	Albion
Angell Barber Pastor	C	Rochester, N. Y.
John Cope Pastor		Ann Arbor
Clyde Raymond Paton	M	Almont
Robert Burns Paton	C	Kansas City, Mo.
Roy Willis Paton		Almont
Ralph Henning Patterson	Ch	Lockport, N. Y.
Clyde Clifford Pattison	Ch	Piedmont, W. Va.
†James Huntington Patton, *a*	C	Springfield, Ill.
William Paynter, Jr.	E	Flint
Fletcher William Pearce	C	Lake Linden
Montague Pearson	M	Saginaw
Frank DeWitt Pease, B.S.E.	M	Detroit
William Winn Peattie	M	Flint
Kuan Hsi Pei	C	Soochow, China
Alfred Heino Pekkala	E	Redridge
Demetrio Rodriguez Pena	C	Santiago, Chile
Edmund de la Pena		Saltillo, Mex.
Paul Willard Pennock		Cleveland, Ohio
William Vincent Penoyar		Toledo, Ohio
Ernest Della Perkins, Jr.	Aero	Battle Creek
Evert L. Perkins	E	Gary, Ind.
Howard Everett Perkins	M	Battle Creek
Vernon Fell Petersen		Kansas City, Mo.
Herbert Kingsley Peterson	E	Manistique
John Arnold Peterson	E	Manistee
Karl Wycliffe Peterson	E	Battle Creek
Signor Peterson	C	Iron River
John Petriwski	C	Cleveland, Ohio
Theodore Maxwell Pettibone	M	Mount Clemens
Elmore Shaw Pettyjohn, A.B.	Ch	Detroit
Paul Brown Pew	M	Chicago, Ill.
Henry William Petzinger		Cleveland, Ohio
Justin Joseph Pfeiffer	Ch	Corning, N. Y.
Frederick John Pfluke	E	Detroit
Alex Elliott Phelps		Cleveland, Ohio
Kenneth Gregory Phelps	M	Ann Arbor
Lawrence August Philipp	Ch	Ann Arbor
Afton Levi Phillips	Ch	Battle Creek
Carvel Stuart Phillips	C	South Lyon
Brace Mitchel Pickens	M	Riga
†Claude Leon Pickens, Jr., *a*	C	Washington, D. C.
Robert Allen Pierce		Saginaw
Morley McRae Piggott		Detroit
Edward Kingsley Pilcher	M	Detroit
Matthew V. Pilcher		Louisville, Ky.

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William John Piper	E	Calumet
Dudley Woodbridge Pitkin	M	Benton Harbor
Ward Harlakenden Pitkin	Ch	Benton Harbor
Herbert Miller Place		Blissfield
Albert Otto Plambeck	Ch	Saginaw
Peter Emil Plambech	M	Ann Arbor
Roy Arthur Plant		Auburn
Robert Theodore Plate	M	Lima, Ohio
Norman Gilbert Platts	Ch	Fort Pierce, Fla.
Roy Frank Plauman		Detroit
Herbert Fredrick Poehle		Detroit
Stanley John Polek		Binghamton, N. Y.
John Richard Polhamus		Denver, Colo.
Arthur John Polker	C	Napoleon, Ohio
Charles Franklin Pollen		Chicago, Ill.
Joseph Polonski		Detroit
Erwin Perry Pomfret		Pontiac
Merlin Lockwood Poole		Windsor, Ont.
Samuel Doak Porter	C	Blissfield
Charles Richard Potter	C	Ishpeming
Clark B. Potter	M	Ann Arbor
Hugh Moore Potter	M	Ann Arbor
Edward Harner Potthoff	Ch	Goldfield, Nev.
Gilbert Webster Potts	M	Toledo, Ohio
Virgil Marion Potts	M	Detroit
Daniel Spencer Powers	C	Decatur
Lewis David Prag		Newark, N. J.
†Arnold Elwyn Pratt, *a*		Ann Arbor
Lewis Stephen Pratt	Ch	Detroit
Percy Raymond Pray		Detroit
Howard Perry Preish	E	Lockport, N. Y.
Moses Prenner		Rochester, N. Y.
Howard Merriam Preston		Battle Creek
Lloyd Robert Preston		Wolverine
Robert Wilmot Preston		Pontiac
Charles Ernest Proctor	M	Flint
William Loring Prout		Rensselaerville, N. Y.
Emerson Henry Puls	M	Ripley, N. Y.
Harry Donald Purdy		Bradford, Pa.
Wesley Howard Puyear	M	Ann Arbor
Isaac Richard Quigley	M	Grand Rapids
Kenneth Henry Quail	E	Croswell
Louis Frank Rahm	M	Leominster, Mass.
John William Ralston	M	Detroit
Philip Conger Ramsdell		Manistee
Howard Earl Ramsey	C	Detroit
Donald Mercer Rankin	M	Terre Haute, Ind.
†Walter Hills Ransford, *a*	C	Detroit
Harry Max Rapaport	M	Lansing
Philip Titus Raymond	C	Saginaw
Wescott Hudson Read	M	Ludington
Russell Roy Reagh		Ann Arbor
Burney Virgel Reany	C	Marquette
Rex George Reason	M	Detroit
Fred William Redemsky	M	Ionia
Frank Maynard Reed	E	Clearfield, Pa.
Harvey Elwyn Reed		Erie, Pa.
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Robert Stanley Reed	M	Hamburg, N. Y.
†Arthur Walter Reichert, *a*		Toledo, Ohio

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Lloyd Brownlee Reid	C	Birmingham
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Robert Lloyd Reid		Avoca
John Randolph Reilly	Mar	Ann Arbor
Joseph Arthur Reinke	C	Detroit
Gordon Custer Reish		Detroit
Theodore Charles Reissing		Hopkins
Harold Henry Remine	E	Kalamazoo
Fred Joseph Renshaw	Ch	Batavia
Thomas Robert Renwick	M	Rockford
†Donald Wells Ressler, *a*	Ch	Pittsfield, Mass.
Samuel Reuben	C	Kalamazoo
†Arnold Ryther Reynolds, *g*	C	Croswell
Cecil Crandall Rhodes	Ch	Ann Arbor
Paul Raymond Rice	C	Massillon, Ohio
Ivor Rosser Richards	C	Alliance, Ohio
John Virgil Richards		Evanston, Ill.
Kenneth Weatherby Richards		Ann Arbor
Raymond Richards		Leetonia, Ohio
Willard Charles Richards	C	Laurium
Elwood Glenn Richardson	Ch	Saginaw
Ernest Stuart Richmond		Ann Arbor
Orrin Henry Rickenbrode	C	Ripley, N. Y.
John Edward Rider		Williamsport, Pa.
Charles Murray Ridgway	Ch	Hydetown, Pa.
Joseph Agnew Riggs	C	Ann Arbor
Karl Frederick Rindelhardt	Mar	London, Ont.
Edwin Frank Ritchie		San Francisco, Calif.
Robert Ellis Roberts, Jr.	M	Grosse Ile
Joseph Jacob Robinove		Ann Arbor
Edgar Russell Robinson		Milwaukee, Wis.
Jack Robinson		Buchanan
Robert Guy Robinson		Ann Arbor
Roland Reed Robinson	Ch	Peekskill, N. Y.
Thomas Mitchell Robinson	M	Detroit
John B. C. Robison		Ann Arbor
Lester Richard Rodenberg	Ch	Lawrenceburg, Ind.
George Holmes Roderick	M	Davenport, Iowa
Roscoe Delphis Rodgers	Ch	Muskegon
Horace Rodriquez		Petorca, Chile
Abner Leech Roe		Washington, D. C.
Norman Carvel Roegner	Ch	Algonac
Leo George Roessner		Clearfield, Pa.
George Earl Rogers, Jr.	C	Grand Rapids
Maurice Vivian Rogers	AII	Ypsilanti
Walter Thomas Rogers	M	Detroit
Humphrey Gavin Rohns	M	Detroit
Claudio Ramon Roig	E	Gualeguay, Argentina
Francis Foster Rollins		Buffalo, N. Y.
Kenneth Michael Ronan	Aero	Marshall
Gerald Seneca Ronk		Highland Park
Irving Henry Ronk		Highland Park
Homer Fred Rosback	M	Benton Harbor
Harry Frederic Rose		Brooklyn, N. Y.
Oscar Randolph Rosen	Ch	Cleveland, Ohio
Isadore Rosenfield	C	Toledo, Ohio
Foster Braman Roser		Flint
Frederick Samuel Roser	C	Ann Arbor
Stephen John Roskosky	Ch	Munising
Cameron Alexander Ross		Buffalo, N. Y.

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Josiah Ross	M	Buffalo N. Y.
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Kenneth Homfeldt Rowells	E	Escanaba
Richard Henry Rowland	Mar	Buffalo, N. Y.
Julius Arthur Rowley		Traverse City
Isadore Ruben	C	Rochester, N. Y.
George Cecil Rubenson	Mar	Youngstown, Ohio
Cecil Harbin Ruby	M	Kitchener, Ont.
Willard Arnold Ruch		Barberton, Ohio
Ralph Charles Rueger	Ch	Highland Park
Harold Benjamin Ruhl		Detroit
Irvine Albert Rummler	Ch	Ann Arbor
John Monroe Russ, Jr.	E	Red Lick, Miss.
Claud Russell	E	Ypsilanti
Robert Lewis Russell		Ann Arbor
Robert Freeborn Ruthruff		Bucyrus, Ohio
Amar Nath Ryar		Punjab, India
Harold Rye	Ch	Sault Ste. Marie
Craig Marion Sage		Hastings
Alban Joseph St. Amour	M	Cheboygan
Maxwell Eugene Salisbury	M	Norwich, N. Y.
George William Sams	E	Bath, N. Y.
Sylvan Samter	Ch	Youngstown, Ohio
†Irwin Tasker Sanborn, *g*	C	Detroit
Federico Sanchez	Ch	Manila, P. I.
Floyd Schager Sanders	M	Traverse City
Alfred William Santelmann	C	Washington, D. C.
Nisa Faulkner Sato	Mar	Nagoya, Japan
Vernon Howard Sauble	M	Detroit
Edward William Saults	Mar	Waterbury, Conn.
Arthur Thomas Saunders	Ch	Washington, D. C.
William Kennon Saunders		Newport News, Va.
Benton Jesse Sauppee	E	Allentown, Pa.
James Nicholas Savage	M	Detroit
Schuyler Lee Savage		Shoals, Ind.
Appasaheb Keshavrao Savant	S-M	Barada City, India
George de la Porte Sawyer	M	Traverse City
Robert Wakeman Schaad		Bay City
Everett Henry Schaefer		Milwaukee, Wis.
Robert Edward Schaefer		Detroit
William James Schanck	M	Pontiac
Henry Ripley Schemm		Saginaw
Rand Gilmore Schenck	M	New Kensington, Pa
Francis Raymond Scherer	M	Rochester, N. Y.
John Otto Scherer	M	Detroit
Herbert Frederick Schiefer		Vassar
Bernard Graves Schimansky	E	Oak Harbor, Ohio
Louis Joseph Schindler	M	Toledo, Ohio
Albert Fredrick Schirmer	M	Saginaw
Oren Henry Schlemmer		Ann Arbor
Herbert Ernest Schlesinger		Ann Arbor
Alfred Courdt Schlobohm	C	Cleveland, Ohio
Prescott Golder Schlotterbeck	E	Ann Arbor
Cyril August Schmidt		Grand Rapids
Edgar Martin Schmiel	S-Ch	Grand Rapids
Richard Cecil Schmitz	E	Ann Arbor
Philip Weir Schnorbach	M	Manistee
Max Robert Schrayer	M	Chicago, Ill.
Clarence Karl Schroen	M	Ann Arbor

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Henry Schuiling	M	Grand Rapids
Paul Frederick Schultz	E	Wichita, Kans.
William Henry Schwartz, Jr.	M	Newark, N. J.
Abraham Moe Sclarow	C	Detroit
†Richard Hearn Scobell, *a*		Erie, Pa.
Albert Forbes Scott	C	Alliance, Ohio
LeRoy Justice Scott	M	Detroit
Richard Cushman Scott	E	Ann Arbor
Joseph Alexander Scruggs	Mar	Brewton, Ala.
Milo Bainbridge Scully		Chicago, Ill.
Leon Arthur Sears	E	Sturgis
Fredrick George Seaver	M	Ypsilanti
Chester Floyd See		Charlevoix
Harold Clyde Seeley	E	Holly
Howard Boltwood Seeley	E	Port Austin
William Harvey Seeley	M	Pontiac
Joachim Eberhart Seeliger	M	Cape Town, South Africa
Stanley Milton Seidman	E	Cleveland, Ohio
Dean Campbell Seitz	M	Greensburg, Pa.
Frank Selzer, Jr.	C	Grand Rapids
Harold Joseph Senior	C	Buffalo, N. Y.
Emilio Serra	C	Ponce, P. R.
Martin John Serra		Calumet
Howard Servatius		Kansas City, Mo.
†John Montague Sessions, *g*	C	Detroit
Max Anthony Shaffer	M	Brookville, Pa.
Louis Shapero	E	Detroit
Howard Parker Sharp	M	Buffalo, N. Y.
Harold Trent Shaw		Detroit
Herbert Madison Shaw	M	Detroit
Howard Dobson Shaw	E	Colfax, Iowa
Howard Irwin Shaw	Ch	Mount Morris, Ill.
Robert Carson Shaw		Templeton, Mass.
Percy Linton Shawley		Ypsilanti
Daniel Joseph Sheehan	Mar	Northampton, Mass.
Ernest Sewall Shepard	M	Washington, D. C.
Charles Edwin Shepherd		Lafayette, Ind.
Elwyn Burton Sheppard		Lockport, N. Y.
Lawrence Clair Sheppard		Marlette
Howard Augustus Sheridan		Scotland, Ont.
Herman Samuel Sherman	Ch	Cheyenne, Wyo.
Demetrius Samuil Sherotsky	M	New York, N. Y.
†Raymond Gardone Sherrick, *a*	Aero	Canton, Ohio
George Earl Shimel	C	Grand Rapids
Stanley Mitchell Shindel	C	Philadelphia, Pa.
Bernard Harvey Shirk	Ch	Louisville, Ohio
Rollin John Shouldice		Battle Creek
Stanley Samuel Herbert Shoup	M	Bay City
Webster Karl Shroyer		Yorktown, Ind.
Claude Melville Shurtleff	M	Cross Village
Roswell Blaine Shurts	Ch	Lebanon, Ohio
Carl Frederick Herman Siekmann	Ch	Buffalo, N. Y.
Adam Siemons, Jr.	C	Grand Rapids
Kenneth McKinley Sifritt	E	Marion, Ohio
Fred Christian Sigle	M	Detroit
Donald C. Sigler	E	Pinckney
Ward Samuel Sikes	M	Benton Harbor
Frederick Frank Sima		Ypsilanti
Walter Heath Simmons	M	Richmond
Hawley Starr Simpson	C	Croswell
Gur Bakhsh Singh	S-C	Punjab, India

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John Robert Skuba			New Castle, Pa.
Howard Willard Slack	C		Jackson
Harold Randolph Slagh	Ch		Holland
Kenneth LeRoy Slater	C		Pontiac
Henry Winston Slaughter			Evanston, Ill.
Arthur Slock			Houghton
Leonard Alexander Slowinski	M		Detroit
Robert Merrall Smibert	M		Waterbury, Conn.
Charles Moffatt Smillie	M		Detroit
Earl Jennings Smith	E		New Castle, Pa.
Francis Livingston Smith	C		Muskegon
Grant Harold Smith	C		Petersburg
Herbert Ewart Smith	M		Rome, N. Y.
Hobart Franklin Smith	Ch		Detroit
†Kenneth Clyde Smith, *a*			Euclid, Ohio
Lawrence Stanley Smith			West Alexandria, Ohio
Marshall Edgar Smith, Jr.			Flint
Myron William Smith	M		Ann Arbor
Norman Joseph Smith	M		Saginaw
Paul Albert Smith	Ch		Morning Sun, Iowa
†Patrick John Smith, *a*			Glouster, Ohio
Ray Wolcott Smith			Elmore, Ohio
Raymond DeMott Smith	Aero		Cleveland, Ohio
Richard Davis Smith	E		Culbertson, Mont.
Robert Frederick Smith	C		Saginaw
Roland Franklyn Smith			Detroit
Schuyler Brower Smith	Mar		Port Huron
Stiles Curtiss Smith	M		Cleveland, Ohio
Stuart Brainard Smith	M		Hinsdale, Ill.
William Bryce Smith			San Antonio, Tex.
†William Earl Smith, *a*			Rochester, N. Y.
William Waits Smith			Joplin, Mo.
Arthur Milton Snider			Ann Arbor
Richard Russell Snow	C		Parma
John Earl Sommers	M		Clifton Springs, N. Y.
†Frederick William Sovereign, *a*		M	Port Huron
Thomas Howard Spain	Aero		Nashville, Tenn.
Charles Milton Spaulding	M		Buffalo, N. Y.
Kenneth Wheeler Spencer	M		Washington, D. C.
Melvin Clifford Sperry	C		Huron, Ohio
†Clifford Henry Spicer, *a*			Rushton
Hoyt Parmelee Spicer			Battle Creek
Waldemar Arthur Spiegel	Aero		Ann Arbor
William Allen Spindler			Essex, Ont.
Alan Rodger Spraker	E		Grand Rapids
Clinton Alden Springer	Ch		Whitehall
William Earle Stadel	M		Grand Rapids
Ralph Abbott Stadler	C		Lima, Ohio
William Lewis Stadler	M		Lima, Ohio
Erwin Jacob Staebler			Ann Arbor
Harold Meyer Stafford			Detroit
†Stanley Theodore Stancevitch, *a*		M	Detroit
Hugo Leonhard Stanger	E		Ann Arbor
†Clarence Leon Stanley, *a*			Detroit
James Stanworth			Chatham, Ont.
Howard Augustus Stape			Rochester, N. Y.
Harold Walter Stark	Ch		Lake Linden
Frank Louis Starkie			New Rochelle, N. Y.
William Dana Starkweather	C		Hamburg, N. Y.
Arthur Daniel Stouffer	Mar		Rochester, N. Y.
Reaumur Coleman Stearnes, Jr.	M		Cordele, Ga.

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Varnum Bert Steinbaugh	C	Ann Arbor
Carl Alexander Steindler		Muskegon
Arthur Michael Stellwagen		Ann Arbor
Robert Henry Stellwagen		Ann Arbor
Lado Stepanek		Detroit
Orville William Stephens		Carbondale, Pa.
Richard Tracy Stephens		Detroit
Robert Alden Stephens	Mar	Sandusky, Ohio
Emerson Marlowe Stevens	M	Owosso
Tyler Revere Stevens		Portland, Me.
Donald Gordon Stewart		Toledo, Ohio
Herschel Henderson Stewart	E	Washington, D. C.
Milbourne George Stewart	C	Sault Ste. Marie
†Frank Stiles, Jr., *a*		Battle Creek
Erwin Hans Stiller		Detroit
†Walter Clifford Stinson, *g*	C	Elkhart, Ind.
Clarence George Tobias Stipe	C	Ann Arbor
William Edward Stirton		Detroit
Arthur James Stock, Jr.	M	Detroit
Leslie Warren Stoddard	M	Detroit
Robert MacAdam Stoddard	M	Wilmette, Ill.
Clifford Edward Stone		Buffalo, N. Y.
Harold Albert Storms		Chelsea
Fredrick Ray Storrer	C	Owosso
Harvey Albert Strahl	M	Wells
Devere Gibson Stranahan	M	Flushing
Gordon Edwin Strassburger		St. Louis, Mo.
Donald Burt Stratton	E	Owosso
William Henry Strickler	Ch	Kleinfeltersville, Pa.
George Richard Strimbeck, Jr.	Ch	Saginaw
Frank Henry Stritmatter	M	Toledo, Ohio
Harold Kimball Strout	C	Portland, Me.
Charles Kirk Strozensky	C	Flint
Earl Fred Strubb		Toledo, Ohio
Arthur Henry Stuart	Ch	Ypsilanti
Robert Simpson Stuart	M	Constantine
Rex Lesnet Sturdevant		Manchester
Orange Scott Sturtevant		Ypsilanti
Julio Choliere Sueldo		La Paz, Bolivia
Stanley Shoichi Sugihara		Honolulu, Hawaii
Juan Cruz Suguitan	C	Laoog, P. I.
Emil Adam Suits	M	Ann Arbor
Leland Taylor Summers		Port Huron
Padma Malla Sundar	E	Khatmandu, Nepal, India
Oliver Erik Sundquist	Mar	Muskegon
John Peter Sutter		Buffalo, N. Y.
Samuel Mayhew Sutter	M	Detroit
Warren Manning Swager	Ch	Youngstown, Ohio
Donald Miller Swan		Detroit
Bertan Rose Swanger		Battle Creek
Lamont Swanson	M	Falconer, N. Y.
Robert Emerson Swart	M	Detroit
Blair Kinch Swartz	M	Reading, Pa.
Henry Paul Swayze		Holly
Arthur Jarvis Sweet		Jackson
Clarence Joseph Swigert	M	St. Joseph
Fred Chester Swigert		St. Joseph
Edward Joseph Talaska	C	Ironwood

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Kwan Yan Tang		Honolulu, Hawaii
Pedro Diccion Tanguilig	C	Pangasinan, P. I.
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Frederic Charles Taylor		Port Huron
†Gale Wirt Taylor, *a*	C	Chelsea
Herndon Taylor	C	Bismarck, N. Dak.
Ralph Henry Taylor		Saginaw
Walter Hubbard Taylor		Ann Arbor
William John Lorne Taylor		London, Ont.
Pablo Simon Tecson		Bulacan, P. I.
Ray Palmer Teele, Jr.		Washington, D. C.
Jorge Sergio Sarzola Tellez	E	Mollendo, Peru
Arthur Henry Tessin	M	Freeland
Lew Wallace Thayer	Ch	Jackson
Kling Thitathan	M	Chumpon, Siam
Wayne Stokes Thomas	Mar	Detroit
Horace Alword Thompson		Herkimer, N. Y.
Theodore Campbell Thompson		Ishpeming
Reginald Aldrich Thomson	M	Glens Falls, N. Y.
George Eugene Tillitson		Grand Rapids
Wesley Tuckermon Tillotson		Genoa, Ohio
Theodore Andrew Timchac	M	Saginaw
George Richard Titcomb	M	Gardner, Mass.
Maxwell Monroe Titlow	C	Goldfield, Nev.
Charles Lawrence Tomlinson	C	Dayton, Ohio
Laurence Emerson Townsend		St. Johns
Richard Emory Townsend	Ch	Saginaw
Robert Wellman Townsend	M	Nashville
Elizabeth Luz Trachsel	M	Ann Arbor
Norman Kay Trackett	M	Saginaw
Thomas Francis Tracy	C	Rochester, N. Y.
Victor Nichols Tracy	M	Brockport, N. Y.
George Dewey Tramp	C	Buffalo, N. Y.
Herbert Arthur Traut	M	Detroit
Frank Joseph Travers	C	Fort Wayne, Ind.
Samuel William Traylor	M	Allentown, Pa.
Donald Earl Trefry	E	Kalamazoo
Frank Wareham Trevorrow	Mar	Detroit
John Henry Trevorrow	E	Greenland
Laurence Elmer Trippe		Utica, N. Y.
Russell Hyder Trites		Detroit
Howard Samuel Trodahl	M	Daggett
Charles Edward Trout	M	Toledo, Ohio
Fred Robert Trucks	E	Plymouth
Robert Mantell True	Ch	Jackson
Clarence Anthony Trump		Minneapolis, Minn.
Henry Andrew Trupiano		Marshall
†Arthur Russell Truscott, *a*	E	Hancock
Ying Ming Tse	Ch	Chicago, Ill.
Howard Downing Tubbs	C	Andover, N. Y.
Elton Brink Tucker	Ch	Otsego
Charles Edward Turnbull	C	Washington, D. C.
Donald Crouch Turner	E	Rochester, N. Y.
Myron Willard Turner	E	Vassar
Ransom Carlton Turner	M	Allegan
James Henry Tuttle	E	Tulsa, Okla.
John Prey Tynes	E	Buffalo, N. Y.
Richard Batson Tynes	E	Buffalo, N. Y.
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Bert Edward Uebele, Jr.	M	Chicago, Ill.
Paul Ueberhorst	E	Bay City

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Lee William Unger, Jr.		Clairton, Pa.
Wellington Tanner Urch	M	Bay City
Lawrence Claudius Utberg	E	Republic
Russell Oscar Utke		Cleveland, Ohio
Robert Cass Vail	M	Chicago, Ill.
Allen Schuler Valk	Mar	Muskegon
Rodulfo Serra del Valle, Jr.		Ponce, P. R.
William Andrew del Valle		San Juan, P. R.
Tracy Henry Van Buren		Sturgis
Harold den Bleyker Van Deman	Ch	Toledo, Ohio
Peter Van Domelen, Jr.	Ch	Grand Rapids
Arie Vander Meulen		Pretoria, South Africa
Glen Van Horn	C	Pinckney
Lee Van Horn	Ch	Pinckney
†Frank John Lewis Van Natta, *a*		Erie, Pa.
Ronald Edward Van Tassel	C	Pontiac
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Percy Field Guy	Seattle, Wash.
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John Alfred Lukens	Toledo, Ohio
James Clifton McClure	Long Rapids
Clarke Munro McColl	Port Huron
Colin Campbell McCormick	Owosso
Earl William McKelvey	Pittsburgh, Pa.
Earl Baldwin McKinley, A.B.	Ann Arbor
James Harold Mathews	Niagara Falls, N. Y.
Lionel Newkirk Merrill	Saginaw
Marshall Rinker Metzgar, Ph.B., *Lafayette College*	Stroudsburg, Pa.
Clinton Cromwell Mills	Ann Arbor
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Alexander Tarnavsky	Cleveland, Ohio
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Chen Lang Tong, A.B., *Shanghai College*	Shanghai, China
Lan-tsung Tsu, *a*	Shanghai, China
De Norval Unthank, A.B.	Kansas City, Mo.
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George Wesley Williamson, *a*	Indianapolis, Ind.
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Helen Lee Wong	Shanghai, China
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Faustino Manago, LL.B., *University of the Philippines*	Imus, Cavite, P. I.
Vicente del Rosario, LL.B., *University of the Philippines, g*	Manila, P. I.
John Wu, LL.B., *The Comparative Law School of China*	Ningpo, China

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Adelbert George Bouchard, A.B., *Lawrence College*	Munising
Alan Wilson Boyd, A.B.	Indianapolis, Ind.
Carl Gunard Brandt	Ludington
George Austin Brown, A.B., *University of Kansas*	Topeka, Kans.
Jose Maria Cajucom, A.B., *University of the Philippines*	Manila, P. I.
Sam Shannon Canterbury, A.B., *University of Missouri*	Tulsa, Okla.
Melvin Joseph Cassidy	Ottawa, Ill.
George Douglas Clapperton, A.B., *Amherst College*	Grand Rapids
Reginald McCall Cobbs	Akron, Ohio
Abe Jerome Cohn	Spokane, Wash.
Millard Bryan Conklin, A.B., *Park College*	St. Paul, Nebr.
Valois Earl Crossley	Ann Arbor
Harry Herbert Despond, A.B.	Ann Arbor
Howard Albert Donnelly, A.B.	Detroit
Earl George Dorfner	Seattle, Wash.
Thurman Bernard Doyle	Menominee
Rodney Arthur Dunnette, A.B.	Byron, Minn.
Ralph Everett Gault, A.B.	Flint
Frank Leroy Greenwald	Whiting, Ind.
Wallace Clare Hall, A.B.	Ann Arbor
Arthur Jesse Hass, A.B.	New York, N. Y.
Harold William Hawkins	Urbana, Ohio
Charles Virgil Hicks	Alpena
Lyle Donald Holcomb	Grand Rapids
Ward Morris Hopkins, A.B.	Freedom, N. Y.
Elden Reed Hunt, A.B.	Ramsey, Ill.
Sidney Kent Jackson	Ligonier, Ind.
Sydney Arthur Jacobs	Detroit
Olive Scott Johnson, A.B., *Oberlin College*	Ann Arbor
Walter Oscar Red Johnson.A.B.	Youngstown, Ohio
Lee Everett Joslyn, Jr., A.B.	Detroit

* A dagger (†) preceding a student's name signifies that he also pursued studies, for the whole or a part of the year, in another School or College of the University, indicated by an italic letter following the name, to-wit: *a*, College of Literature, Science, and the Arts; *e*, College of Engineering; *ea*, College of Architecture; *m*, Medical School; *p*, College of Pharmacy; *h*, Homœopathic Medical School; *d*, College of Dental Surgery; *g*, Graduate School. The letter following the name (without the dagger), indicates that the student is pursuing a combined curriculum, leading to a degree in each of the two.

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Siegel Wright Judd, B.S., *Dartmouth College*	Grand Rapids
Oscar Anshel Kaufman	Detroit
Eva Katherine Kilpatrick, A.B.	Ann Arbor
Edward Knuff, A.B.	Johnstown, Pa.
Leo Kuschinski, A.B.	Detroit
George Richard Larwill	Adrian
Isadore Edward Levine, A.B.	Michigan City, Ind.
Raymond McKinley Lewis	Adrian
Charles Albert Libby	Elkhart, Ind.
Feng Chu Liu, A.B.	Kirin, China
Andrew Watson Lockton	Battle Creek
Bruce Brummitt Loring	Valparaiso, Ind.
Clarence Ellsworth Lott	Iron River
Helmuth Elrod Maag	Tripp, S. Dak.
Thomas Francis McAllister	Grand Rapids
James Inglish McClintock, A.B.	Canon City, Colo.
Frank Martin, Jr., A.B.	Boise, Idaho
Edward Maximillion Martinek	Menominee
Lewis Hunt Mattern, A.B.	Dayton, Ohio
Christian Frederick Matthews, A.B.	Mount Clemens
Robert Foster Matthews	Shelbyville, Ky.
Clarence Edward Page	Ann Arbor
Frank Clark Patterson, B.S.	Ann Arbor
Joseph Wilmer Planck, A.B.	Union
Donald Charles Porritt, B.S., *Ohio Northern University*	Pontiac
Hugo Vit Prucha, A.B.	Cleveland, Ohio
John Holly Rapp, A.B., *University of Illinois*	Fairfield, Ill.
Henry Ravenel, A.B., *George Washington University*	Washington, D. C.
Edward John Richards, A.B., *Bucknell University*, A.M., *ibid.*	Homestead, Pa.
Paul Dwight Roach	Alliance, Ohio
Ronald Robertson	Sebring, Ohio
Lee Charles Robinson	Hoopeston, Ill.
Marian Roose, A.B., *Wellesley College*	Perrysburg, Ohio
Turner McKinley Rudesill, A.B.	Rapid City, S. Dak.
Harry Woodrow Rudine	Salt Lake City, Utah
Norman Herman Sallwasser	LaPorte, Ind.
Harold Marion Shapero, A.B.	Detroit
Owen Thomas Sharkey, A.B.	Johnstown, Pa.
Harold Raphael Smith, A.B.	Detroit
Henry W. Smith	Tyro, Ark.
Winter Nicholas Snow, A.B., *Hillsdale College*	Mars Hill, Me.
Carl Andrew Sorling	Moline, Ill.
Charles Bryant Stegner	Titusville, Pa.
Herman Horace Stephenson	Fredonia, Kans.
Jean Paul Thoman	Lansing
Herbert Leroy Thornton, A.B., *Albion College*	Ann Arbor
Walter Roscoe Tonkin, A.B.	Edwardsburg
Glenn Alex Trevor, A.B., *Augustana College*	Moline, Ill.
Frank Leonard Walters, A.B.	Lansing
Lester Elba Waterbury, A.B.	Chicago, Ill.
Ross Noble Wetherbee, Litt.B., *Princeton University*	Detroit
Roscoe Stanley Wilkey, A.B., *DePauw University*	Urbana, Ill.
George Byron Wolfe	Bradford, Pa.
Donald Lansdale Wood, A.B., *Centre College*	Maysville, Ky.
Ernest Luttrell Zeigler	Maysville, Ky.
Arthur Edward Zigler	Elkhart, Ind.
Fay Scott Zimmerman	Washington Court House, Ohio

SECOND YEAR STUDENTS

George Franklin Aldrich	Ann Arbor
George Dewey Anderson, A.B.	Evanston, Wyo.
Edward Miller Apple	Ann Arbor

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Maxwell Forrest Badgley	Jackson
Cyril Edmund Bailey, A.B.	Detroit
Carl Uno Oscar Bay	Ironwood
Willis Blakeslee	Quincy, Ill.
Robert McDowell Boyd	Saginaw
David Hale Brake, A.B., *Albion College*	Ann Arbor
Leonard Joseph Brooks, A.B.	Goshen, Ind.
George Owen Brophy, Jr.	Kansas City, Mo.
Lawrence Edmonds Brown, A.B.	Ypsilanti
Frederick Doran Carroll	Manistique
John Cornelius Cary, A.B.	Grand Rapids
John Mitchell Chase, A.B.	Clearfield, Pa.
Haldon Hixon Cites, A.B.	Wanatah, Ind.
Cedric William Clark, B.S., *Oregon State College*	Corvallis, Ore.
John Crafton Clark, A.B., *Knox College*, A.M.	Galesburg, Ill.
Frederick Eberman Clary	Jamestown, N. Y.
Robert Jefferson Coker, Jr., LL.B., *University of Mississippi*	Yazoo City, Miss.
Albertus John Cook	Grand Haven
Frank Mills Cornwell	Jefferson, Ohio
James Goodrich Coston, A.B.	Osceola, Ark.
Frank Ward Culver	Detroit
Robert Brown Cunningham	Louisville, Ky.
Clarence Herbert Daley, A.B.	Ann Arbor
John Wilson Dalton	Junction City, Kans.
Edward Carlos Pitt Davis, A.B.	Battle Creek
Morris Kearns Davis, A.B., *University of Utah*	Salt Lake City, Utah
John Funk Dodge	Webster City, Iowa
Thomas Sylvester Dougherty	Chenoa, Ill.
John Mirabeau Durbin	Cynthiana, Ky.
Jasper Frank Eaton	Proctorville, Ohio
Wilbur Alexander Eldridge, A.B.	Bay City
Dewey Frank Fagerburg, A.B.	Paxton, Ill.
William Spencer Flint, A.B., *University of Nebraska*	Omaha, Nebr.
Richard Alexander Forsyth, A.B.	Gladstone
John Arthur Friedlund	Chicago, Ill.
Fred Aloysius Garlepy, A.B.	Harbor Springs
Milton Harris Goldberg	Sullivan, Ind.
Norton Lambert Goldsmith, A.B.	Louisville, Ky.
Paul Walker Gordon	Oquawka, Ill.
William Henry Granse, A.B.	Saginaw
Perry Roberts Green	Waco, Tex.
Raymond Leaver Green, A.B.	Toledo, Ohio
Don Mahone Harlan, A.B.	Hudson
Glenn Leroy Hollenbeck	Lapeer
Harry Leon Horinbein	Waterbury, Conn.
William Sleeper Isham	Fowler, Ind.
Charles Fenner Ives, A.B., *Trinity College*	Detroit
Marion Fay Jones	Woolstock, Iowa
Paul Fouts Jones	Danville, Ind.
Earle E. Kincaid, A.B., *Ohio University*	Malta, Ohio
Walter Allan Kirkby	Jackson
Leo Warren Kuhn, A.B., *Kansas Wesleyan University*	Salina, Kans.
David B. Landis, A.B.	Goshen, Ind.
Fredric Paul Gearhart Lattner	Dubuque, Iowa
Frederick Houlton Lauder, A.B., *University of Illinois*	Monmouth, Ill.
Wilfrid Rhodes Laurie	Chatham, Ont.
Henry Jackson Leasure	Cleveland, Ohio
Harold Willets Lee	Ann Arbor
Julian Tully Lett, A.B.	Marion, Ind.
Ezra William Lockwood, A.B.	Highland Park
Edward Nelson Long	Dearborn
George Elbert Longstaff	Huron, S. Dak.

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Henry Anderson McCown, A.B., *Ohio Wesleyan University*	Proctorville, Ohio
Archie Duncan McDonald, A.B.	Ormond, Ont.
George Francis Malcolm	Pocahontas, Iowa
Roger I. Manwaring	Ann Arbor
Ralph Alex Mayer	Ligonier, Ind.
Bruno Herman Miller	Ann Arbor
Walker Hill Mills, A.B.	Decatur, Ill.
Clark Russell Missimore	Hillsboro, Ill.
Kenneth Bradley Montigel	Alma
John Harper Moore, A.B.	Allegan
Edmund Bailey Morcom, A.B., *University of Nebraska*	Omaha, Nebr.
Samuel Charles Morris, A.B.	Three Oaks
Joe A. Morrison	Drayton, N. Dak.
Howard Davega Moses, A.B.	Ann Arbor
George Ignatius Murphy, A.B.	Harbor Beach
Clyde Van Vleck Nutten	Detroit
William Callam O'Keefe, A.B.	Saginaw
James Olds	Mount Gilead, Ohio
William Crane Palmer	Ann Arbor
Louis Arthur Parker, A.B., *Grinnell College*	Sioux Rapids, Iowa
David Cleo Pence	Ottawa Lake
Stephen Furman Perry, A.B., *Oberlin College*	Jefferson, Ohio
George Campbell Quinnell, A.B.	Pickford
Richey Blendon Reavill	Denver, Colo.
Harry Benson Reese	Wellston, Ohio
Samuel Hynes Riggs	Ann Arbor
William Raimond Ringer, A.B., *Indiana University*	Williamsport, Ind.
Sheldon John Sauer	Plano, Ill.
Herman Jack Saulson	Detroit
Carl Germann Schmiedeskamp, A.B.	Quincy, Ill.
Ulric Carl Scott	St. Cloud, Minn.
George Seletto, A.B.	Witt, Ill.
Victor Hugo Simmons, A.B.	Hartford City, Ind.
Charles James Smith	Ottumwa, Iowa
Clarence Leroy Smith, A.B.	South Lyon
Malcolm Ream Smith	Homer, Nebr.
Merle Eugene Smith, A.B.	Youngstown, Ohio
James Eldredge Spier	Mount Clemens
Edwin Blythe Stason, A.B., *University of Wisconsin*, B.S., *Massachusetts Institute of Technology*	Sioux City, Iowa
Merle Charles Stitt, A.B.	Brackenridge, Pa.
Clem Franklin Storckman	Mount Carmel, Ill.
Harold Eberhardt Storz	Royal Oak
Paul Oliver Strawhecker	Grand Rapids
Harry Sunley	Detroit
Chalmer Cline Taylor, A.B., *University of Illinois*	LeRoy, Ill.
Frederick Mott Thompson, Jr.	Waterford
James Napoleon Trumble	Watseka, Ill.
Charles Edward Turner, A.B., *University of Illinois*	Mount Sterling, Ill.
Roger James Vaughn, A.B., *Knox College*	Dallas City, Ill.
Kirke Coldwell Veeder, A.B., *University of Kansas*	Cherryvale, Kans.
Owen Jefferson Watts, A.B.	Wagoner, Okla.
George Philip Weadock	Detroit
Paul Graf Weber	Canton, Ohio
William McKinley Webster	Dixon, Ill.
Jewel Edgar West	Tipton, Ind.
Leslie Paul Whelan	Muskegon
Harry Clifton Willson	Detroit
Archibald Davies Wilson, A.B.	New Castle, Pa.

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FIRST YEAR STUDENTS

Milton Ralph Atlas	Detroit
William Henry Bales, A.B., *DePauw University*	Winchester, Ind.
Delbert Genar Barclay, A.B.	Oklahoma City, Okla.
Abraham Herman Baron	Sioux City, Iowa
Nayf George Bashara	Detroit
Leonard Glenn Bean	Walla Walla, Wash.
†Edwin Charles Bowers, *a*	Rossford, Ohio
Earl Francis Boxell, *a*	Marion, Ind.
Lee Richard Boyd	Kankakee, Ill.
Joseph Bernard Boyle	Hornell, N. Y.
Paul Snodgrass Brady, *a*	Ann Arbor
Paul Rudolph Cash	Alma
Francis Edmund Chadwick	Detroit
Webb Rufus Clark, *a*	Greenville, Ohio
Laurence Chester Coffey, A.B., *York College*	Oxford, Nebr.
Joseph Leo Cohen	Indianapolis, Ind.
Wade Parks Connell, *a*	Hot Springs, Ark.
John Corcoran Cowing	Joliet, Ill.
Claude Edmond Crandall	Oskaloosa, Iowa
Algot John Dahlberg	Escanaba
Frederick B. Darden	LaCrosse, Wash.
Elwyn George Davies, *a*	Newark, Ohio
Richard deNobel, *a*	Ashtabula, Ohio
Marvin LeRoy DeVries	Holland
George Duffield, *a*	Detroit
Earle Edlin Ewins, *a*	Ann Arbor
Wendall Thomas Fitzgerald, *a*	Ogden, Utah
William Peter Fortune	Springfield, Ill.
Austin Miller Frease, *a*	Napoleon, Ohio
Joseph Freedman, *a*	Vancouver, Wash.
Jacob William Freiden	Council Bluffs, Iowa
Lloyd William Friedman	Grand Forks, N. Dak.
Gordon Michaelis Gale	Oakesdale, Wash.
Paul Milburn Glisson, A.B., *Union College*	Jackson, Tenn.
Harry Eugene Goldberg	Grand Forks, N. Dak.
Guy Theron Graves, Jr.	Pender, Nebr.
Stanley Stimson Hawkes	Detroit
Howard Edward Hays, *a*	Hobart, Okla.
George Hendrick Heideman, A.B.	Calumet
Samuel Jackson Chapman Hess	Ann Arbor
Franklin Brokaw Hettinger, *a*	Hutchinson, Kans.
Joseph Vernon Hodgson, *a*	Sault Ste. Marie
Joseph Clarence Hooper	Ann Arbor
Roy Payton Hull	Dallas City, Ill.
Hajime Iwanaga, *a*	Kealakekua, Hawaii
Edward John Jeffries	Detroit
William Harcourt Johnston, *a*	Cadillac
Harold Andrew Jones, *a*	Detroit
Julian Hayward Joseph	Robinson, Ill.
William Samuel Kelly	Newton, Iowa
Roland Otto Kern	Reese
Robert Ottis Kerr	Butte, Mont.
John Howard King	Auburn, Ky.
Dwight John Krumboltz, A.B., *Parsons College*	Fairfield, Iowa
Joseph Warren Langton	Pembina, N. Dak.
Fred Dewey Leonard	Wagoner, Okla.
Hyman Levinson, *a*	Detroit
Llewellyn Edward Lloyd	Johnstown, Pa.
Ray Edwards McCall	Ithaca
Chalmers Leavitt McGaughey	Indianapolis, Ind.
Mahlon Jones Macgregor	Detroit
Dan Henry McNeal, A.B., *Knox College*	East Moline, Ill.

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George Washington Manderbach, *a*	Reading, Pa.
Hollis Cherrington Martin, A.B., *Rio Grande College*	Royal Oak
John Edward Maurice Merrill	Yale
William Henry Messinger, *a*	Fulton, Ind.
Daniel Kingston Messner, A.B.	Oxford, Ind.
Earl Miles	Ann Arbor
Clyde Young Morris, A.B., *University of New Mexico*	Shiprock, N. Mex.
Arthur Frederick Neef, *a*	Detroit
Gilbert Nelson	Chicago, Ill.
Patrick Stuart Nertney	Ottawa, Ill.
Haskell Linton Nichols	Homer
Roy Thomas Noonan	Madelia, Minn.
Maurice Ralph Norcop	Ann Arbor
Gerald Kelly O'Brien	Houghton
William Henry Older, A.B., *Adrian College*	Adrian
Frank Merrill Parrish, A.B., *Allegheny College*	Meadville, Pa.
William Cyrus Rice, III.	Grand Rapids
Clyde Fergus Richardson	Marquette
Justin A. Roberts	Noblesville, Ind.
George William Rochester	Marion, Ill.
Ceilan Herbert Rorick	Toledo, Ohio
Henry Glenn Ross, A.B.	Mansfield, Ill.
Grattan Lauder Rourke	Lisbon, N. Dak.
Milton John Sallwasser	LaPorte, Ind.
Herman Howard Schluntz	Joliet, Ill.
Jack Potter Shillaber	Detroit
Harold Watson Slabaugh, A.B., *Dartmouth College*	Akron, Ohio
Benjamin Theodore Smith, A.B.	Grand Rapids
George Howard Edward Smith	Ann Arbor
Russell Warner Smith, *a*	LaPorte, Ind.
Plummer Braham Snyder, B.S., *Michigan Agricultural College*	East Lansing
Carlos Augustus Spiess	Santa Fe, N. Mex.
Harry Ruffin Stanley	Marion, Ill.
Judson Luther Stark	Hymera, Ind.
John Steketee	Grand Rapids
Elmer Leonard Stephenson	Monett, Mo.
Rodney Leo Stuart	Galesburg, Ill.
Loren Edgar Sullivan	Springfield, Ill.
Rhe O. Tague	Ann Arbor
Paul Melancthon Tedrow, A.B., *Kalamazoo College*	Kalamazoo
Lawson Edwarde Thomas, B.S., *Florida Agricultural & Mechanical College*	Detroit
Frank Joel Treckelo	Elkhart, Ind.
George Oliver True, *a*	Port Clinton, Ohio
Thomas Ingle Underwood, *a*	Ann Arbor
Laurence Reed Van Ness, A.B.	Chicago, Ill.
Wayne Van Osdol	Junction City, Kans.
Richard John Wall	Toledo, Ohio
William Robert Walsh	Morrill, Nebr.
Clarence Clifford Watson, A.B., *Ohio Wesleyan University*	Proctorville, Ohio
George William Watson, *a*	Ann Arbor
Ben Walter Weir	Weir, Kans.
Thomas Joy Whinery, *a*	Grand Rapids
Maurice Marsh White	Blandinsville, Ill.
Harrie Lawson Wickey	Kansas City, Mo.
Lewis Ronald Williams, *a*	Huron, Ind.
William Hazen Willmot	Ypsilanti
Herbert Earle Wilson	Indianapolis, Ind.
William Henry Wilson, A.B., *University of Kansas*	Bisbee, Ariz.
Paul Revere Wilson	Detroit
John McAfee Winters, Jr.	Quincy, Ill.
Walter Edward Wobrock, *a*	Detroit

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Frederick Fullerton Wynn, *a*	Sherwood, N. Dak.
Christian Marcus Youngjohn	El Paso, Texas

SPECIAL STUDENTS

George Pierce Cantrell	Tulsa, Okla.
Heber Scott Hudson	Bloomington, Ill.
Maurice Everett Jacobs	Sharon, Wis.
William Henry Kaplan	Detroit
Anderson Dewey Meadows	Hinton, W. Va.
Gertrude Elstner Woodard	Ypsilanti

The students named below, enrolled in the College of Literature, Science, and the Arts, also pursued studies in the Law School, although not registered in the combined curriculum.

Kenneth Clifford Klepser	Omaha, Nebr.
Robert Williams Kneebone	Ann Arbor
Wesley L. Nutten, Jr.	Detroit

The students named below, enrolled in the Graduate School, also pursued studies in the Law School.

Earle Hoyt Ketcham, Ph.B., *University of Chicago*	Grand Rapids
William Andrew Kohler, A.B., *Pennsylvania College*	Port Royal, Pa.
Ernest Bernhard Schulz, B.S.E.	Cleveland, Ohio

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College of Pharmacy

FACULTY

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VICTOR C. VAUGHAN, M.D., Ph.D., Sc.D., LL.D.
FREDERICK G. NOVY, M.D., Sc.D., LL.D.
EDWARD D. CAMPBELL, B.S.
MOSES GOMBERG, Sc.D.
S. LAWRENCE BIGELOW, Ph.D.
EDWARD H. KRAUS, Ph.D., Sc.D., *Acting Dean*
ALVISO B. STEVENS, Ph.C., Ph.D.
HARRISON M. RANDALL, Ph.D.
DAVID M. LICHTY, Ph.D.
HOBART H. WILLARD, Ph.D.
WALTER F. HUNT, Ph.D.
FLOYD E. BARTELL, Ph.D.
CLIFFORD C. GLOVER, Ph.C., M.S., *Secretary*
CLIFFORD C. MELOCHE, Ph.D.
CHESTER S. SCHOEPFLE, Sc.D.
HERBERT W. EMERSON, B.S., M.D.
CHARLES H. STOCKING, B.S.
PHILLIP B. HADLEY, Ph.D.
WILLIAM F. HAUHART, Ph.D.
ROY K. McALPINE, A.B.
ALFRED L. FERGUSON, B.Pd., Ph.D.
WILLIAM J. McGILL, A.B.
CARL D. LARUE, A.M.
HAROLD R. SNOW, M.S.(Chem.)
FREDERICK W. SULLIVAN, M.S.

STUDENTS*

Monica Minerva Allen	B.S.	Harbor Beach
Helen Anderson	B.S.	Manistee
Ernest Fredrick Bach	B.S.	Sebewaing
Irene Elizabeth Baisley	B.S.	Detroit
Mary Angela Barbaras	S.	Dubuque, Iowa
Tripp Waldo Blackmer	B.S.	Milan
Paul Andrew John Boone	Ph.C.	Zeeland
Earl Albert Burk	Ph.C.	Mount Clemens
William Howard Byrd	B.S.	Cassopolis
Charles Leslie Carter	PhC.	Cleveland, Ohio

* The abbreviations following the name indicate the degree for which the student is studying. Where instead the letter S is given, the student is pursuing miscellaneous studies without being registered as a candidate for a degree. A dagger (†) preceding a student's name signifies that he has pursued studies, for the whole or a part of the year, in another School or College of the University, indicated by an italic letter following the name, to-wit: *a*, College of Literature, Science, and the Arts; *e*, College of Engineering; *ea*, College of Architecture; *m*, Medical School; *l*, Law School; *h*, Homœopathic Medical School; *d*, College of Dental Surgery; *g*, Graduate School.

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Hugh Edwin Caskey	B.S.		Harbor Springs
Harry Divine Connell	Ph.C.		Belding
Max Anton Costa	B.S.		Norway
Donald Colburn Culver	Ph.C.		Saginaw
Troy Cook Daniels	Ph.C.		Torrington, Wyo.
James Henry Delaney	Ph.C.		Erie, Pa.
George Lea DeVine	B.S.		Dexter
Omar Freeman Dickrager	Ph.C.		Tionesta, Pa.
Richard Wilford Dillon, Ph.C.			Benton, Ill.
Duane H. Eidson	Ph.C.		Berrien Springs
Walter Bernard Erickson	Ph.C.		Gladstone
Paul Matter Faulkner	B.S.		Middleville
Allen Lane Fenton	S.		Kingsley
Harry Erskine Fiero	Ph.C.		Detroit
Frederick Ludwig Fischer	B.S.		Glen Lyon, Pa.
Clarence Norman Fletcher	B.S.		Wellington, Ohio
Norman Edward Gable	Ph.C.		Detroit
Louis Napoleon Gibbons	Ph.C.		Harrisburg, Ill.
†Willard Clarence Haight, *ea*	S		Flint
Elmer Lionel Hammond	B.S.		Chelsea
Cyril Franklin Hanft	B.S.		Detroit
Ernest Linwood Harris, Jr.	B.S.		St. Louis, Mo.
Marshall Albert Hess	Ph.C.		Detroit
Alice Hoover	B.S.		Whitmore Lake
John James Hugan	Ph.C.		Ann Arbor
†James Franklin Hunter, B.S., *g*	Ph.C.		Warren, Ohio
John Moffett Inglis	Ph.C.		Madison, Ind.
Harold Charles John	S		Mount Clemens
Sarah Elizabeth Kaplan	Ph.C.		Hartford, Conn.
John Emerson Kinsey	Ph.C.		Detroit
Edward Klein	B.S.		Bayonne, N. J.
David Judah Kravchell	Ph.C.		Cleveland, Ohio
Amos Ludwig Kroupa	Ph.C.		Cedar
Arthur Ernest Lampert	Ph.C.		Grand Rapids
Samuel Lipman	B.S.		Bayonne, N. J.
Paul Leroy Livingston	B.S.		Grand Rapids
Frances Mildred Lutes	B.S.		Richmond
Kenneth James MacKenzie	B.S.		Escanaba
Clarence Benjamin Mason	Ph.C.		Winchester, Ky.
Clayton Bradley Matteson	Ph.C.		Mason
Walter Mattson	Ph.C.		Wakefield
Mitsuo Miura	B.S.		Kumamoto, Japan
Dale Horton Moats	B.S.		Harrisville, W. Va.
Raymond Morris	Ph.C.		Harrisburg, Ill.
Margaret Jennie Muir	Ph.C.		Almont
Charles Hiram Newman	Ph.C.		Muskegon
Isao Nishimura	B.S.		Osaka, Japan
Namio Ohtomo, Ph.C., *University of South California*		S	Sendai, Japan
Grenville Beardsley Paine	Ph.C.		Grand Ledge
John Austin Palmer	Ph.C.		Detroit
Leander Connerly Parker	B.S.		St. Louis, Mo.
Kenneth Edward Parry	B.S.		Port Huron
Alfred John Pingel	Ph.C.		Mount Clemens
†Earl Andrew Powers, *a*	Ph.C.		Grand Rapids
†William Fredrick Pringnitz, *a*	B.S.		Mount Clemens
Rosa Bell Ream	S.		Copemish
Lynn Bailey Roby	Ph.C.		Coldwater
Wilber Nelson Rutherford	Ph.C.		Potsdam, N. Y.
Esther Charlotte Sandberg	B.S.		Manistique
Harold Eugene Schlichting, Ph.G., *North Dakota Agriculture College*	B.S.		Port Sanilac

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John Gideon Searle	Ph.C.	Evanston, Ill.
Raymond Clyde Smith	Ph.C.	Port Huron
Stuart Stanislaus Steffey	Ph.C.	Ann Arbor
Herbert Allen Stewart	S.	Monmouth, Ill.
Walter Denis Strother	Ph.C.	West Milford, W. Va.
Byron Wilkins Swift	B.S.	Grand Blanc
Wilber Walter Sylvester	Ph.C.	Port Huron
George Carl Tasker	B.S.	Lake Odessa
Nelda Grayce Taylor	Ph.C.	Pensacola, Fla.
Russell Lowell Taylor	B.S.	Elyria, Ohio
Robert Daniel Thomas	Ph.C.	Youngstown, Ohio
Harold Jay Thorburn	Ph.C.	Mason
Smith Jerome Thorington	Ph.C.	Grand Rapids
Theodore Frederick Thorsberg	B.S.	Midland
Elmer John Traut, Ph.G., *Northwestern University*		B.S. New Athens, Ill.
Kyung Pau Tsong	B.S.	Shanghai, China
Garnet Fluence Van Horn	Ph.C	Salem, W. Va.
Shad Watkins Vincent	Ph.C.	Lapeer
Herbert Fredrick Von Ewegen	B.S.	East Toledo, Ohio
Leonard Ransom Wagener, Ph.C.	B.S.	Ann Arbor
Edward Francis Walicki	Ph.C.	Jackson
Charles Merville Warner	Ph.C.	Middletown, Ohio
Raymond Chase Warner	B.S.	Milan
Lillian Grace Watson	B.S.	Detroit
Edward Cecil Watts	B.S.	Peru, Ill.
Leonard Eugene Weaver	B.S.	Detroit
Frederic John Wenzler	B.S.	Fort Wayne, Ind.
Harvey Allan Whitney	Ph.C.	Adrian
Carroll Burns Williams	B.S.	St. Louis, Mo.
Joseph Bawl Young	B.S.	Detroit
Milton Carl Zink	Ph.C.	Toledo, Ohio

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Homœopathic Medical School

FACULTY

MARION L. BURTON, Ph.D., LL.D., *President*
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OTIS M. COPE, A.B., M.D.
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J. A. WILLIAM JOHNSON, M.D.
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HARVEY B. WYNN, M.D.

Assistants

FLORENCE B. BUCKLEY
JAMES R. DURLING, A.B., B.S., M.D.
GEORGE W. CHAMBERS, A.B.
GEORGE W. COLLINS, Ph.C., M.S.
DOROTHY W. CALDWELL, M.S.
NELS OLSON, B.S., M.D.
FRANCES B. RIPLEY, M.D.

STUDENTS*

RESIDENT PRACTITIONERS

Nels Olson, B.S., *State University of Iowa*, M.D.	Lake Mills, Iowa
Frances Ball Ripley, M.D., *Hering Medical College*	Bellingham, Wash.

* A dagger (†) preceding a student's name signifies that he has pursued studies, for the year or a part of the year, in another School or College of the University, indicated by an italic letter following the name, to-wit: *a*, College of Literature, Science, and the Arts; *e*, College of Engineering; *ea*, College of Architecture; *m*, Medical School; *l*, Law School; *p*, College of Pharmacy; *d*, College of Dental Surgery. The letter (without the dagger) indicates that the student is pursuing a combined curriculum, leading to a degree in each of the two.

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FOURTH YEAR STUDENTS

Hugh Angus Cameron, M.D., *Hahnemann College, Philadelphia*	Waterbury, Conn.
Horace Lester French	Lansing
Howard Henry Harpst, A.B., *Toledo University*	Toledo, Ohio
Carl Eugene Shaw	Dayton, Ohio
Richard Benjamin Penzotti, A.B., *Albion College*	Orion
Wilbur Warren Williams, M.D., *Electic Medical College, Cincinnati*	Bronson
Harold Edward Wisner	Ann Arbor

THIRD YEAR STUDENTS

Wilbur Lincoln Casler, B.M.E., A.M., *Chicago University*	Marquette
George Walter Chambers, A.B., *University of Nashville*	Anderson, S. C.
Roy Herbert Holmes	Grand Rapids
Wallace Miller Johnson	Lansing
Earl Forest Lutz	Wyandotte
Jason Bidwell Meads	Tecumseh
Dayton Turner Pulford	Toledo, Ohio

SECOND YEAR STUDENTS

Carl Clark Bailey	Brooklyn
Ernest William Bauer	Wyandotte
Henry Procter Buckingham	San Francisco, Calif.
Joshua Kenneth Cole	Penn Yan, N. Y.
Russel Oscar Davidson	Detroit
Russell Franklin Fenton	Ann Arbor
Herman William Galster	Erie, Pa.
Melville Ai Goldsmith, B.S., *Fargo College*	Fargo, N. Dak.
Evelyn Lucile Ruffe Grant, A.B., *Vassar College*	Grand Rapids
Paul Marland Kober	Rochester, N. Y.
William Mathias LeFevre, A.B.	Muskegon
Clement Elton Lockwood	Ann Arbor
Clarence Henry Peachey, B.S., *Hobart College*	Phelps, N. Y.
Suel Andrew Sheldon, *a*	Marne
George Ray Upton	Long Beach, Calif.
Frank Van Schoick, *a*	Ann Arbor
John Frederick Vick	Ann Arbor
George Thacher Waggoner	Spartansburg, Pa.
Howard Smith Willson	Lansing
Inez Razeda Wisdom	Ann Arbor

FIRST YEAR STUDENTS

Arthur John Brickbauer	Elkhart Lake, Wis.
Harold Joseph Brisbois	Detroit
Francis George Cook	Harbor Springs
Michael Jay Crino	Rochester, N. Y.
Ladislaus Joseph Danielewski	Detroit
Louis Peter Henkel, A.B.	Petoskey
John Arlington Hookey	Wyandotte
David Donald Lonie	Bay City
Loyal Hampton Lumby	Pontiac
†Navarre Philip Marentay, *a*	Detroit
Douglas Hurst Radcliffe	Detroit
Curt Alfred Paul Schneider, *a*	Peru, Ill.
Rafael Limjuco Teopaco	San Fernando, P. I.
Richard Henry Thornbury	Arcade, N. Y.
Clarence Jay Williams	Eaton Rapids
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HOMOEOPATHIC HOSPITAL TRAINING SCHOOL FOR NURSES

THIRD YEAR STUDENTS

Gertrude Pauline Brydges	Bailey
Gail Davidson	Evart
Alice Elizabeth Edwards	Wayland
Ruth M. Gillette	Jackson
Beatrice Edith Hill	Ann Arbor
Edith Amelia Kerr	Sarnia, Ont.
Edna Lily Kneisley	Kenton, Ohio
Leona Lake	Benton Harbor
Margaret Frederike Lambert	Chelsea
Glenda M. Miller	Evart
Marjorie June Otto	Grand Ledge
Margaret Kane Rogers	Omena
Fern Harris Scott	Grand Rapids
Cleo Slagle	Kenton, Ohio
Lillian Mary Spear	Athena, Pa.
Florence Irene Summers	Grand Ledge
Teresa Thomas	Aylmer, Ont.
Mary Ellen Towns	Ludington

SECOND YEAR STUDENTS

Ruth Anna Densmore	Charlotte
Janice Arlone Des Ermia	Onsted
Grayce Kaye Johnson	Kent City
Honora M. Johnson	Hudson
Minnie Reys	Ypsilanti
Mildred Irene Symes	Sparta
Florence Armida Tunison	Colon

FIRST YEAR STUDENTS

Doreatha Blinn	Addison
Emma Dittmer	Algona, Iowa
Florence Dayton	Jackson
Alice Malinda Henrikson	Newaygo
Hazel Winifred Henrikson	Newaygo
Eliza Jane Leishman	Cass City
Helen Laidlaw	Tawas City
Arda Muck	Onsted
Anna Louise Ray	Parma
Eunice Stanley	Sault Ste. Marie

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ERMAN O. SCOTT, M.S.(Chem.)
ALBERT J. HALL, D.D.S.

Demonstrators and Assistants

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ERNEST E. CODY, A.M., D.D.S.
FLOYD B. CRILL, D.D.S.
J. DWIGHT GLOVER, D.D.S.
ARNOLD J. LABBA, D.D.S.
JOHN M. PARSONS

Special Lecturer

MILTON T. WATSON, D.D.S.

STUDENTS*

FOURTH YEAR STUDENTS

Carl Allen, A.B., *University of Rochester*	Rochester, N. Y.
Isadore Max Alpert	Rochester, N. Y.
Carl Baccaro	Newark, N. J.

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Florence Katherine Butler	Rose City
Raymond Field Cannon	Laurium
Philip Russell Carroll	Hancock
Ray Verne Chase	Ishpeming
Ruth Martin Conway	Sault Ste. Marie
Donald Benjamin Darling	Ann Arbor
James Nye Donaldson	Detroit
Charles D'Urban Dyason	Pretoria, South Africa
Gilbert Ernest Dyason	Pretoria, South Africa
Henry Otto Erbland	Rochester, N. Y.
Lien Tsung Fong	Shanghai, China
Edgar Lorenz Forsyth	Detroit
Joseph Frankel, Ph.B., *Yale University*	New Haven, Conn.
Edward Thomas Furey	Detroit
Earl August Gelhaar	Detroit
James Page Ghysels	Grand Rapids
Harold Norman Gotschall	Minerva, Ohio
Max Greenspan	Newark, N. J.
Henry Hicks	Ann Arbor
Harry George Hinckley	Jamestown, Kans.
Frederick George Knepple	L'Anse
Elmer Jacob Kuivinen	Wakefield
Carl Anderson Lund	Muskegon
Julio Luzunaris (Bruno), B.S.	Ann Arbor
Donald Chalmers Lyons	Jackson
Charles Joseph McCann	Saint James
George Goodwin McKnight	New Castle, Pa.
Malin Dewey Martin	Powell, Pa.
Frank Glock Merz, Jr.	Brooklyn, N. Y.
George Neal Morrill	Ann Arbor
Julia Hannah Nordstrom	Negaunee
Paul P. Paine	Maple Rapids
John Cornelius Porter	Hughesville, Mo.
Moses Rattner	Detroit
Lawrence Gregory Raub	Olean, N. Y.
John LeRoy Reed	Butler, Pa.
Harry Arnold Ruskin	Windsor, Ont.
Alexander Ruzwick	New Castle, Pa.
Francis William St. Louis	Ford, Ont.
Hendrik Jacobus Schoeman, A.B., *Cape Town University*	Cradock, South Africa
Gordon Hugo Sindecuse	Albion
Edward Roberts Stoliker	Ann Arbor
Andries Menzo Strauss	Pretoria, South Africa
David Tybutus Sundstrom	Iron Mountain
Arthur Tarloff	Toledo, Ohio
Douglas Melephont Teal	Midland
Floyd Lawrence Vernier	Pontiac
Benjamin Weiss	Newark, N. J.
Willem deWildt Wium	Wellington, South Africa
Walter Fred Wood	Herkimer N. Y.
Theofil Wilfred Wozniak	Bessemer
Gary Ernest Wright	Conneaut, Ohio
Abner Mark Yeager	Lockport, N. Y
Vahan Titus Zogalian	Ann Arbor

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Edwin Crenshaw Beebe	Howell
Nelson Andrew Beeckel	Vermillion, Ohio
Isaac Bennish	Detroit
Adolphe Bessie	Quincy
Harold Duane Billmeyer	Raub, N. Dak.
Milo Morthland Bostwick	Albion
Martin James Broodrijk	Johannesburg, South Africa
Arthur Haight Brown	Tecumseh
William Merrill Brown	Menominee
Clarence Reed Buell	Jackson
Robert Wilson Christie	Muskegon
Dirk Pieter Cilliers	Bethlehem, South Africa
Morris Cohen	New Haven, Conn.
George August DeLand, B.S., *Carleton College*	Ann Arbor
Bernard Joseph Dunn	Grand Blanc
Cyril Ayers Dyer	Port Huron
John Norman Eastland	Detroit
Burton Eder	Detroit
Theodor Eugene Eger	Ishpeming
Howard Clayton Eldredge	Cleveland, Ohio
Eugene Robert Eleson, A.B., *University of Illinois*	Elkhart, Ind.
Wesley Irwin Follis	Sault Ste. Marie
Harold Wright Fowler	Hillsdale
Frank James Fox	Allendale
Richard Christopher Gorman	Waddington, N. Y.
Arthur Archie Ginsberg	Detroit
Elmer Greenstone	Rochester, N. Y.
Dorothy Gerald Hard	Detroit
Yervant Jacob Harrian	Detroit
Kirke Franklin Harrington	Paw Paw
Frain Chester Hartwell	Reading
Christian Rudolph Henning, A.B., *University of South Africa*	Louis Trichardt, South Africa
Benjamin Heyns	Ladybrand, South Africa
Francois Hoffman	Bethulie, South Africa
Otto Kendall Holland	Wellsville, Ohio
Alfred Agnew Hook	Ann Arbor
John Henry Hutchins	Detroit
Frederick Stephen Jermain	Calumet
Russel Edward Klinestiker	Dorr
Willem Johan deKock, B.Sc., *University of Stellenbosch*	Cradock, South Africa
Victor Porter Learmont	Yale
George LeBaron Lockwood	Sault Ste. Marie
Walter Clar McBride	Caseville
Gordon Renwick Maitland	Port Huron
Redvers Edwin Merry	Tulbagh, South Africa
Schalk Willem van der Merwe, B.Sc., *University Cape of Good Hope*	Stellenbosch, South Africa
Edward Carl Meyer, B.C.E.	Mount Clemens
Manuel Gorgonio Miranda	San Juan, P. R.
James Earl Murphy	Schenectady, N. Y.
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Marion Daniel Slaughter	Brookston, Ind.
Earl Maley Snyder	Detroit
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Dwight Samuel Stuart	Chateaugay, N. Y.
William McKinley Taylor	Flint
Hendrik Hermanus van Zijl Theunissen	Cradock, South Africa
Frank Walter Tompson	Detroit
Earl Harry Walworth	Battle Creek
Charles Weber	Gaylord
Daniel deWet	Boshof, South Africa
C. Wilford Wilson	Detroit
Claude Revere Womer	Port Allegheny, Pa.
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Johnson Kent Wright	Conneaut, Ohio

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Russell George Alexander	Clare
George Robert Anderson	Cassopolis
Henry A. Anderson	Ludington
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Edward Albert Ashkins	Weymouth, N. S
Harry Albert Atwood	Spokane, Wash.
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Hjalmer Henry Bergh, A.B., *Augustana College*	Marquette
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Howard Houston Burkart	Paterson, N. J.
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George Carlson	Detroit
Frank Salem Cartwright	Detroit
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Eugene Matthew Clifford	Colchester, Conn.
Gerald Cohen	Kimberley, South Africa
Samuel Cohn	Highland Park
Robert Burton Collins	Charlotte
Garrett Dille Conover	Valparaiso, Ind.
Paul Stanley Crane	St. Johns
Frank Thomas Czysz	Dunkirk, N. Y.
Samuel Budd Danto	Detroit
Arthur Gordon Davis	St. Louis
Robert Franklin Deebach	Los Angeles, Calif.
Richard DeLoof	Holland
Harry Arthur Dengler	Grand Rapids
Glenn Philip Dodds	North Branch
Casper Melchoir Droste, Jr.	Grand Rapids
Gilbert Clerc Ely	Waldron
Verner Hansen Eman	Ishpeming
Donald Horace Erpelding	Adrian, Minn.
James Alford Evans	Detroit
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Harry Meyer Friedman	Detroit
Beniamin Franklin Fruehauf	Ann Arbor
Kirk Gardham	Owosso
Richard Everett George	Detroit
Alan Culver Gibson	East Lansing
Richard Harold Gier	Hillsdale
Ralph Parker Giffin	Detroit
Austin Albert Gillhooley	Sault Ste. Marie
Blair Alexander Glennie	Harbor Beach
Harry Goldin	Pretoria, South Africa
Maurice Goldstick	Detroit
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Walter Caldwell Gregg	Oakmont, Pa.
Robert Smith Gregory	Dearborn
Simon Jack Griffinger	Newark, N. J.
James Stanley Grosse	Sydney, Australia
Raymond Joseph Hallinen	Ellicottville, N. Y.
Mark Elliott Hanna	Birmingham
Harold Preston Hart	Port Huron
William Charles Hayes	Bessemer
William Campbell Hicks	Benton Harbor
Charles Downard Hixson	Detroit
Herbert George Holmes	St. Charles
Freeman Bowdle Hover	Lima, Ohio
Philip Jay	Detroit
Robert Walter Johnson	New Castle, Pa.
Benjamin Keller	Newark, N. J.
Samuel Keller	Bayonne, N. J.
Charles Audrey Kelly	Sandusky
Solomon Kesler	Paarl, South Africa
Phillip Nimrod Kief	Montevideo, Minn.
Joseph Louis Kleinstiver	Port Huron
Horace Charles LaBissoniere	St. Paul, Minn.
James Raymond Ladd	Detroit
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Harry White Lundahl	Ishpeming
Douglas Freeman McColl	Grand Rapids
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Clare K. Madden	St. Louis
Duane Bleekman Madison	Herkimer, N. Y.
Jan Stephanus Malherbe	Murraysburg, South Africa
Harold Vitali3 Malin	Marquette
Johannes Lodewikus Marais	Vrijheid, South Africa
John Pierpont Martin, B.S., *Florida Agricultural & Mechanical College*	Detroit
Erwin Fred Mast	Angola, Ind.
George Erwin Meeker	Peru, Ind.
Philippus Meiring	Bloemfontein, South Africa
Hendrik Petrus van der Merwe	Robertson, South Africa
John Henry Miller	Sturgis
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George Raymond Moore	Ottawa, Ohio
John Halley Nicholson	Sandusky, Ohio
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Martin Patrick O'Hara	Ann Arbor
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Francis Joseph Reichmann	Everett, Wash.
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Verne Roscoe Richards	Detroit
Leslie Frederick Rittershofer	Ann Arbor
Leslie Charles Rolfe	Crystal
Merritt Rundel Roof	Climax
John Harvey Shackleford	Mobile, Ala.
DuVoid J. Shepard	Breckenridge
Harry Wade Shields	Ann Arbor
William Sigle	Detroit
Samuel Chiam Silver	Detroit
Joseph Frank Smiggen	Detroit
Donald William Smith	Ann Arbor
Laban Herbert Smith	Springville, N. Y.
Henry Victor Solosky	Midland
Ralph Frederick Sommer	Detroit
Bernardus Zebee Stegmann	Cradock, South Africa
William H. Stevens	Grand Rapids
Benjamin Hobert Stickney	Massena, N. Y.
Ralph Edwin Stonehill, B.S., *Wooster College*	Canton, Ohio
Floyd Erwin Straith	Detroit
William Henry Sturm	Pigeon
Leonard Stutz	New Castle, Pa.
Chester F. Sulkers	Holland
Eldred Irving Swanson	Iron Mountain
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Curtis Orton Thompson	Vassar
Lester Lee Thompson	Vassar
Helene Theodosia Tines	Detroit
Joseph Harold Todd	Bluffton, Ohio
Joseph James Tolan	Ironwood
Charles Augustus Towsley	Midland
Charles Henry Truesdell	Detroit
Fred Lytle Tucker	Hillsdale
Cornelis Johannes Van Rooijen	Harrismith, South Africa
William Joseph Vidaver	Detroit
William Aloysius Vignetto	Hancock
Matthijs Strijdom de Villiers	Bethlehem, South Africa
Reuben Andrew Wagner	Ann Arbor
Raymond William Walmoth	Detroit
James Patrick Warren	Dunkirk, N. Y.
George Franklin Weaver	Charlevoix
Martin Morris Weisberg	Detroit
Paul Lester Wellman	East Lansing
Ernest Edmund Whale	Ishpeming
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Robert McMaster Winslow	Valparaiso, Ind.
William Gerson Zieve	Detroit
Landis Myron Zimmerman	New Castle, Pa.

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Rolf James Barber	Newberry
Roscoe L. Barrus	Ovid
Glenn Earl Barton	Port Huron
Alfred Peter Beaudin	Newberry
Luster Franklin Best	Jackson
Foster William Bevier	Big Rapids
Muriel Frances Birmingham	Detroit
Gerald Samuel Black	Detroit
William Calvin Bowne	New Brunswick, N. J.
Max Brown Breier	Butler, Pa.
Joseph Henry Bresnahan	Detroit
Glenn R. Brooks	Chelsea
Bert Earle Brotherton, Jr.	Port Huron
Floyd Otto Brown	Toledo, Ohio
Ralph Myron Brown	Mount Pleasant
†Dean Howard Brumm, *a*	Nashville
Walter Matthew Bullock	Little Falls, N. Y.
Rudolph Lee Burt	Bradford, Pa.
William J. Cary	Grand Rapids
Dick Collins Chapman	Dowagiac
Jean Huguenot Cilliers	Johannesburg, South Africa
Chester Arthur Cloeting	Muskegon
William Jesse Cobb	Laurence
Meyer Cohen	Sault Ste. Marie, Ont.
Hazen Pingree Cole	Detroit
Lisle Eugene Cooper	Big Rapids
William Warren Crebs	Bellevue, Ohio
†Orra Ben Crego, *a*	Detroit
Edward Karg Crosby	Findlay, Ohio
†John Randle Crissman, *a*	Washington
Paul Donald Davis	Salem, W. Va.
Dell Douglass Dean	Renovo, Pa.
George Norman Deming	Detroit
Albert David Diamond	Paterson, N. J.
Francis Dunbar Falvey	Houghton
Cletus Bernard Farrell	Stockbridge
Fred Nelson Fazakerley	Paterson, N. J.
William Firestone	Cleveland, Ohio
Howard Robert Fisher	Palmyra, N. Y.
Stuart Thayer Friant	Muskegon
Maurice Harvey Gantz	Detroit
Ray Horace Gelder	Elmira, N. Y.
Herman Wayne Gibson	Findlay, Ohio
John Clark Giffen	Detroit
Allan Edward Gilmore	Michigan City, Ind.
Duncan Edward Goodwillie	Detroit
Arthur Daniel Graham	Dutton, Ont.
Orrin Arthur Gregerson	Stoughton, Wis.
Gert Hendrik Grobler, A.B., *University Cape of Good Hope*	Bethlehem, South Africa
Walter William Grothaus, A.B., *Ohio State University*	Detroit
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Herbert Harrison	Detroit
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Kenneth Clifton Hoagland	Blissfield

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Paul Harold Jeserich	Detroit
Edward Thomas Jones	Iron Mountain
John Oliver Jones	Royal Oak
Parke Lee Jones	Cass City
Elmer John Juistema	Grand Haven
Arthur James Junker	Coudersport, Pa.
John Webb Kellogg	Bay City
David Jacob Kesden	Rochester, N. Y.
Milton Max Ketcik	Indiana Harbor, Ind.
Johannes Strydom deKlerk	Albertinia, South Africa
Glenn Weston Koyl	Sault Ste. Marie
Herman Edgar Kozlow	Detroit
Stephanus Kruger	Venterstad, South Africa
Fern Harry Kutt	Munith
William Adrian La Grange	Paarl, South Africa
James Charles Lavens	Detroit
James Francois Le Grange	Standerton, South Africa
Montagu Levinson	Johannesburg, South Africa
Russell Vivian Levitt	Williston, N. Dak.
Harold Wesley Little	Powers
Maxwell Irving Loeffler	Detroit
Olaf Louis Loikrec	Windsor, Ont.
Harley Freeman Lown	Detroit
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Everett W. Lyon	Ypsilanti
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Frank Daniel McIntyre	Jackson
Benton Irving Marks	Oscoda
Warren Franz Martin	Ann Arbor
William Carl Marx	Holyoke, Mass.
Rollo James Masselink	Big Rapids
Herman David Mast	Angola, Ind.
Egmont Samuel Meinecke	Detroit
†Philip Rae Miller, *a*	Iron River
Vernard LeRoy Miller	Charlevoix
Ernest Carl Mohrlock	Chelsea
Gorton Jacob Montique	Mount Clemens
Warden Luft Moyer	Bellevue, Ohio
Christopher Ioakim Mubayas	Detroit
Earl Joseph Mulcahy	Detroit
Daniel Joseph Murphy, Jr.	Scranton, Pa.
Edward Gerald Murphy	Dunkirk, N. Y.
Harold Robinson Nichols	Carey, Ohio
Oliver Edward Nobert	Munith
Edwin Ralph Olila	Ashtabula, Ohio
Oscar Christian Olsen	Saginaw
Jacob Michael Oswald	Crystal Falls
Norris B. Palmer	Maybee
Louis Reuben Peskin	Sioux City, Iowa
Tylar Eugene Phelps	Detroit
Hubert Charles Phillips	Hillsdale
Theodore Roosevelt Porter	Ann Arbor
Roger Paul Powers	Marshall
Marthinus Jacobus duPreez	Fouriesburg, South Africa
John Abraham Raubenheimer	George, South Africa
Arthur Henry Reimann	Iron River
Robert Rein	Cape Town, South Africa
Andrew Richardson	Sharon, Pa.

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George Alexander Ritchie	Sault Ste. Marie
Johann Rorich	Kroonstad, South Africa
Donald William Rosie	Grand Haven
Sydney David Samuel	Johannesburg, South Africa
Carl Robert Schoonraad	Pretoria, South Africa
†Frederick William Schroeder, *a*	Detroit
Max B. Schuster	Detroit
Bernard Segall	Richmond Hill, N. Y.
Elsie Caroline Seitz, A.B.	Ann Arbor
John Frederick Sivula	Ishpeming
Thomas Allen Soults, Jr.	Rochester, N. Y.
Howard Burton Steffey	Bronson
Frederick Raymond Storm	Detroit
William Frederick Streit	Detroit
Julian Otto Strong	Azalia
Louis Richard Swaab	Toledo, Ohio
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Jacob Johannes duToit	Sweetwater, South Africa
Clarence Joseph Totte	Detroit
Homer Atwood Tuley	Detroit
Harry William Tustison	Ann Arbor
Karl Harold Valentine	Dunkirk, N. Y.
Merle Adin Vance	Nashville
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Donald Merle Wagner	Delevan, N. Y.
Ralph Neven Weaver	Butler, Pa.
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Raymond Leonard Wheaton	Detroit
Cecil Ovid Wilcox	Ionia
Lyle Smith Wilhelm	Traverse City
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Maxwell Winslow	Detroit
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Marion Amelia Ames, A.B. — Lansing
Bacteriology
Gordon Rowen Anderson, B.S.E., *sp* — Brantford, Ont.
Simeon Duval Anderson, B.S.F. — Geneseo, Ill.
Forestry
†Thomas Colby Anderson, *e* — Union City
Chemical Engineering
Elsie Venner Andrews, A.B., *Michigan State Normal College*, *sp* — Ypsilanti

* The department of specialization selected by candidates for an advanced degree is indicated under their respective names. Students not candidates for a degree are marked *sp*. Students pursuing graduate studies in classes meeting in neighboring cities are marked *ext*. Unmarked names indicate students enrolled during the academic session of 1920-1921; *abs* shows that the student was permitted to complete some course in absentia.

A dagger (†) preceding a student's name indicates that he also pursued studies, for the whole or part of the year, in some other School or College of the University, indicated by an italic letter following the name, to-wit: *a*, College of Literature, Science, and the Arts; *e*, College of Engineering; *ea*, College of Architecture; *m*, Medical School; *l*, Law School; *p*, College of Pharmacy; *h*, Homœopathic Medical School; *d*, College of Dental Surgery.

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Physics
Stephen Stanley Attwood, B.S.E., *sp* Ann Arbor
Bethel Jay Babbitt, A.B., *Oberlin College*, M.S., *s* Ann Arbor
Physics
Margaret Barlow, A.B., *sp*, *ext* Detroit
†John Scott Barnes, *a* Geneva, N. Y.
Forestry
Barbara Halcker Bartlett, B.S., *Columbia University*, *sp* Ann Arbor
Almira Caroline Bassett, A.B., *Maryville College* Maryville, Tenn.
Latin
John Henry Bateman, B.C.E., *sp* Ann Arbor
†James Francis Beal, *e* Ann Arbor
Civil Engineering
Arthur Lynn Becker, B.S., *Albion College*, A.M., *ibid*, *s* Hillsdale
Physics
Dwight O. Becker, B.S.E., *sp* Jackson
Myron Louis Begeman, A.B., B.M.E. Cedar Falls, Iowa
Mechanical Engineering
Newton Silas Bement, A.B. Webberville
Spanish
Abram Cornelius Benjamin, A.B. Grand Rapids
Philosophy
Claude Leon Benner, A.B., *s* Adrian
Economics
Earl Forest Benson, A.B., *sp*, *ext* Detroit
Lowe Franklin Berger, A.B., *Columbia University* Winfield, Iowa
Economics
Helen Cornelia Bishop, A.B., *Pacific University*, B.S., *Columbia University*, *sp* Ann Arbor
Eleanor Bittner, A.B., *Alma College* Alma
Latin
Isabella Maud Black, A.B., *sp*, *ext* Detroit
Ruth Berdina Blekkink, A.B., *Hope College* Holland
History
Frederick Franklin Blicke, B.S. Bucyrus, Ohio
Chemistry
Lee Bonar, A.B., A.M. Belleville, W. Va.
Botany
Oets Kolk Bouwsma, A.B. Muskegon
Philosophy
Charles Elwyn Brake, A.B., *Kalamazoo College*, *sp*, *ext* Detroit
†Geraldine Brasie, *a*, *sp* Ann Arbor
Harold Hudson Britton, A.B., *s* Ann Arbor
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Joseph Walter Britton, A.B. Rockville, Ind.
Chemistry
Ernest G. Brock, B.S.(Educ.), *Kansas State Normal School*, *sp*, *ext* Detroit
†Lois E. Brooks, *a*, *sp* Ann Arbor
Wilber Esmond Brotherton, Jr., A.B., M.S. Ann Arbor
Botany
Carl Richards Brown, A.B., *University of Kansas*, A.M., *ibid* Lawrence, Kans.
Psychology
Frances Josephine Brown, A.B., *sp* Port Huron
†George Carlton Brown, *e*, *sp* Hollansburg, Ohio
George Granger Brown, B.S.(Ch.E.), *New York University*, *sp* Ann Arbor
Clifford Charles Buchler, B.S.(Chem.) Washington, D. C.
Chemistry
Charles Arthur Burton, B.S.E. Lakewood, Ohio
Mechanical Engineering

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Wallace Ellwood Cake, B.S.(Chem.), M.S. — Ann Arbor
Botany
Dorothy Walcott Caldwell, B.S., *Rhode Island State College,* M.S., *ibid,* M.S. — Kingston, R. I.
Bacteriology
Henry Munroe Campbell, A.B., LL.B., *Harvard University, sp, s* — Detroit
Howard Burt Cannon, B.S., *Michigan Agricultural College,* M.S., *Cornell University, sp, ext* — Ann Arbor
Ramon Capistrano, A.B., *University of the Philippines* — Manila, P. I.
Economics
Elisabeth Carey, A.B., *University of Minnesota,* A.M., *ibid, sp* — Ypsilanti
Dwight Clark Carpenter, B.S., *Michigan Agricultural College,* M.S. — Ann Arbor
Chemistry
Arthur Raymond Carr, B.S.E., *s* — Ann Arbor
Chemical Engineering
Lowell Juilliard Carr, A.B., *s* — Ann Arbor
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Eber Malcolm Carroll, A.B., A.M. — Ann Arbor
History
Charles Seraphin Carry, B.L., *Besancon, France* — Ann Arbor
Romance Languages
Lee Owen Case, B.S.E. — Ann Arbor
Chemistry
†Vivencio Garces Casia, *a, sp* — Grand Rapids
Virginia Grace Cavendish, A.B., *sp* — Huntington, W. Va.
Harcourt Lenhart Caverly, A.B. — Toledo, Ohio
Economics
Katherine MacFarlane Chamberlain, A.B., A.M., *sp, s* — Port Huron
Edward Hastings Chamberlin, B.S., *State University of Iowa* — Iowa City, Iowa
Economics
Hannah Irene Champlin, A.B. — Little Valley, N. Y.
Landscape Design
Howard Rufus Chapman, A.B., *Shurtleff College, sp* — Ann Arbor
Shih Yu Cheng, B.S.(Eng.), *National University of Peking* — Wuhu, China
Highway Engineering
Charles Beed Clark, A.B., A.M., *s* — Ann Arbor
Education
Ella Maybelle Clark, A.B., *s* — Saline
Botany
Fred R. Clark, A.B. — Saranac
Botany
Horace F. Clark, A.B., *Pomona College,* LL.B., *National University Law School, sp* — Pasadena, Calif.
Paul Victor Clark, A.B., *s* — Ann Arbor
Chemistry
Sarah Clarkson, A.B. — Ann Arbor
Internal Medicine
Elizabeth Cleveland, A.B. — Detroit
Education
Susanna Ada Clough, A.B., *ext, s* — Detroit
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Botany
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Zoölogy
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Marion Llewellyn Drake, D.D.S. — Ann Arbor
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Harold Dieckmann Draper, A.B., *sp, s* — Saginaw
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Otokar Fierlinger, *Diploma, University of Vienna, sp* — Prague, Austria
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Mechanical Engineering
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Education
Grace Griffin, A.B., *s* — Lima, Ohio
Zoölogy
John Odus Grimes, B.S.(Ed.), *Ohio University, sp* — Ypsilanti
Arthur Otto Groff, A.B., A.M., *s* — Byron Center
German
†Roy William Grumbine, *a* — Freeport, Ill.
Geology
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Public Health
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Highway Engineering
Ross Gunn, B.S.E. — Oberlin, Ohio
Physics
Chandra Mohan Gupta, B.S., *Saint John's College, India* — Ann Arbor
Chemistry
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Melville Harrison Hatch, A.B., *s* — Detroit
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David Lemunyon Haught, A.B., *Salem College, s* — Wheeling, W. Va.
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Ruth Harriet Hayes, B.S., *Illinois Wesleyan University* — Brimfield, Ill.
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Virginia Warren Weeks Heideman, A.B. — Calumet
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Civil Engineering
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Theodore Huntington Hubbell, A.B. — Detroit
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†Allis Fountain Hussey, *a* — Ann Arbor
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Russell Claudius Hussey, A.B., *s* — Ann Arbor
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Charles Albert Langworthy, A.B., *Albion College*, A.M., *ibid* Ann Arbor
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Political Science
Roy S. Lautenschlager, A.B., *Huntington College* Kitchener, Ont.
Political Science
Dai Chin Lee, B.S.(M.E.), *Imperial University, sp* Changsha, China
Bernice Leland, B.S., *University of Pennsylvania, sp, ext* Detroit
†Archie George Leonard, *a* St. Louis
Education
Fred Dewey Leonhard, A.B., *sp* Lansing
Leon Hatchig Leonian, B.S., *University of Kentucky*, M.S. State College, N. Mex.
Botany
Joseph Newhall Lincoln, A.B., *Amherst College*, A.M., *Harvard University, sp* Ann Arbor
Anders Fredrik Lindblad, *Chalmers College of Technology* Ann Arbor
Naval Architecture
Levin Murphy Litzenberger, A.B., *Wabash College* Middletown, Ind.
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Henry Stephens Lucas, A.B., *Olivet College*, A.M., *Indiana University* Ann Arbor
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Sik Chew Lui, B.S., *University of Chicago, sp* Honolulu, Hawaii
†Howard Mason Lumsden, *a* Virden, Ill.
Forestry
Janie Ellen McAllister, A.B., *Talladega College, s* Vicksburg, Miss.
Education
Elwood Kirkland MacAllister, B.S.(C.E.), *sp* Jackson
Samuel Wilson McAllister, A.B. Ann Arbor
Rhetoric
Helen Martha McAlpine, A.B. Cleveland, Ohio
Spanish
Lavinia Gould MacBride, A.B., A.M., *sp* Ann Arbor
Ruth Lillian McClelland, A.B., *Wellesley College* Saginaw
Landscape Design
William James McGill, B.S., M.S., *sp* Ann Arbor
Thomas Aloysius McGuire, A.B., *Brown University* Whitinsville, Mass.
Romance Languages

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Zoölogy — Toledo, Ohio
Elmie Warner Mallory, Ph.B., *Buchtel College*, A.M., *sp, s* — Ann Arbor
Edith Larzelere Mansell, A.B., *sp, ext* — Detroit
Joaquin Mejorada Maranon, B.S.(Phar.), *University of the Philippines, s* — Iloilo, P. I.
Botany
Charles William Margold, A.B., *Columbia University*, A.M., *ibid, s*
Sociology — Hartford, Conn.
Alberto Mariaca, C.E., *University of Chile, sp* — La Paz, Bolivia
Max Skidmore Marshall, B.S., *Massachusetts Agricultural College*
Bacteriology — Amherst, Mass.
Margaret Emily Miller Martin, A.B., *s* — Bay City
Political Science
†Harry L. Marvin, *a* — Elm Hall
Education
Wendell Earle Mason, B.S.E. — Petoskey
Mechanical Engineering
Edward Mathieu, A.B., *Harvard University*, A.M., *University of Washington* — Ann Arbor
Romance Languages
†Emma Clarissa Matthews, *a* — Walled Lake
Latin
Carroll Holman May, A.B., *Ohio Wesleyan University*, A.M., *Harvard University*, Ph.D., *ibid, sp, s* — Indianola, Iowa
Bruno Meinecke, A.B., *University of Tennessee*, A.M., *s* — Holland
Latin
Augusta Barbara Meiser, A.B., *sp, ext* — Detroit
Ermelindo Acisclo Mercado, A.B., *s* — Ann Arbor
Romance Languages
Sugi Mibai, A.B., *Mills College*, A.M., *sp* — Hyogoken, Japan
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Samuel Melvin Michener, A.B. — Bay City
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Arthur Lee Miller, Ph.B., *Adrian College, s* — Detroit
Education
Elroy John Miller, B.S., M.S., *abs* — East Lansing
Chemistry
Gertrude Marie Miller, A.B., *Adrian College* — Adrian
English
†Joseph Musser Miller, *e* — Harrisburg, Pa.
Chemical Engineering
Lura Irene Miller, A.B., *Alma College, sp* — Alma
Wesley Minnis, B.S., *University of Washington*, M.S., *ibid* — Ann Arbor
Chemistry
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Harold Cresse Mott	Athens, Ill.
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Summary of Students*

1920-1921

COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS

Undergraduates	4879	
Students enrolled in classes meeting in neighboring cities.	693	
Public Health Nursing	4—	5576

COLLEGES OF ENGINEERING AND ARCHITECTURE

College of Engineering	2035	
College of Architecture	178—	2213

MEDICAL SCHOOL

Resident Practitioners	1	
Fourth Year Students	75	
Third Year Students	78	
Second Year Students	126	
First Year Students	170—	450

University Hospital Training School for Nurses

Third Year Students	66	
Second Year Students	38	
First Year Students	43—	147

LAW SCHOOL

Fourth Year Students	5	
Third Year Students	97	
Second Year Students	123	
First Year Students	125	
Special Students	6	
Students Primarily enrolled in other Colleges	6—	362

COLLEGE OF PHARMACY

Undergraduates	101—	101

HOMOEOPATHIC MEDICAL SCHOOL

Resident Practitioners	2	
Fourth Year Students	7	
Third Year Students	7	
Second Year Students	20	
First Year Students	16—	52

* Throughout the summaries, in totalling, deductions have been made for names appearing twice in the items added.

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Homœopathic Hospital Training School for Nurses

Third Year Students	18	
Second Year Students	7	
First Year Students	10—	35

COLLEGE OF DENTAL SURGERY

Fourth Year Students	62	
Third Year Students	75	
Second Year Students	159	
First Year Students	159—	455

GRADUATE SCHOOL

Students	440—	440
Net Total, exclusive of Summer Session		9611

SUMMER SESSION OF 1920

College of Literature, Science, and the Arts	1140	
Colleges of Engineering and Architecture	458	
Medical School	169	
Law School	142	
College of Pharmacy	19	
Graduate School	312—	2194
Grand Total, net		10623

TOTAL, INCLUDING THE SUMMER SESSION, AFTER DEDUCTING FOR NAMES COUNTED TWICE

College of Literature, Science, and the Arts	6242
Colleges of Engineering and Architecture	2345
Medical School	566
University Hospital Nurses Training School	147
Law School	439
College of Pharmacy	108
Homœopathic Medical School	52
Homœopathic Training School for Nurses	35
College of Dental Surgery	455
Graduate School	680

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SUMMARY BY STATES*

	Lit., Sci., and Arts.	Eng. and Arch.	Medicine.	Law.	Pharmacy.	Homœopathic.	Dental.	Graduate.	Summer Session.	Total.
Michigan	3636	1289	317	138	62	61	282	269	1238	6472
Ohio	409	205	64	32	9	5	27	26	162	830
New York	212	159	31	5	1	5	30	16	89	483
Illinois	238	65	16	44	7	1	1	15	95	426
Indiana	211	47	30	32	2	—	11	9	70	364
Pennsylvania	172	76	31	13	3	3	19	11	72	355
New Jersey	56	25	4	—	2	—	10	4	11	102
Iowa	43	11	3	12	1	2	1	7	31	100
Missouri	57	13	7	3	3	—	1	—	27	100
Kentucky	34	13	6	7	1	—	—	—	8	65
Massachusetts	23	21	2	—	—	—	2	9	11	64
Connecticut	25	11	4	1	1	1	3	1	10	51
Wisconsin	17	12	7	1	—	1	1	1	16	51
Kansas	24	5	2	8	—	—	1	4	16	49
Minnesota	25	7	3	3	—	—	3	3	11	49
Oklahoma	27	6	—	6	—	—	—	2	15	49
West Virginia	20	4	3	1	3	—	1	6	14	48
District of Columbia	14	25	2	1	—	—	—	3	9	47
Nebraska	22	2	4	8	—	—	—	1	10	43
Colorado	27	6	3	2	—	—	—	—	3	40
California	15	9	3	—	—	2	1	1	6	35
Montana	23	7	2	2	—	—	1	1	3	35
North Dakota	11	9	2	6	—	1	2	—	5	32
Washington	12	4	4	6	—	1	3	1	8	31
Philippine Islands	8	9	1	—	—	1	—	5	12	26
Texas	6	7	2	2	—	—	—	1	8	24
Hawaii	8	3	2	4	—	—	—	2	9	20
South Dakota	8	2	3	3	—	—	—	—	7	20
Tennessee	6	3	2	1	—	—	—	2	9	20
Virginia	8	4	—	—	—	—	—	3	6	20
Florida	8	4	2	—	1	—	—	—	5	17
Mississippi	5	1	—	1	—	—	—	1	11	17
Georgia	9	2	3	—	—	—	—	—	4	16
Porto Rico	6	3	4	—	—	—	1	1	1	15
Louisiana	4	1	—	—	—	—	—	—	9	14
Maryland	8	3	1	—	—	—	—	—	2	14
Arkansas	4	1	1	3	—	—	—	—	7	13
New Mexico	4	2	2	2	—	—	—	1	3	13
Alabama	—	3	1	—	—	—	2	1	8	12
Arizona	7	1	1	1	—	—	—	—	2	11
Maine	1	7	—	1	—	—	—	—	3	11
Utah	7	1	—	3	—	—	—	1	1	11
Wyoming	5	3	—	1	1	—	—	1	2	11

* Throughout the summary by states, for the sake of simplicity, the students in the Nurses Training Schools have been counted with those of the corresponding medical schools.

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SUMMARY BY STATES*

	Lit., Sci., and Arts.	Eng. and Arch.	Medicine.	Law.	Pharmacy.	Homœopathic.	Dental.	Graduate.	Summer Session.	Total.
South Carolina	2	2	1	—	—	1	—	—	6	10
Idaho	5	1	2	1	—	—	—	—	2	8
North Carolina	3	1	1	—	—	—	—	1	3	8
New Hampshire	4	—	1	—	—	—	—	—	2	7
Oregon	4	1	—	1	—	—	—	—	2	7
Vermont	1	2	1	—	—	—	—	—	—	4
Nevada	—	2	—	1	—	—	—	—	1	3
Rhode Island	—	2	—	—	—	—	—	1	—	3
Delaware	2	—	—	—	—	—	—	—	—	2
Virgin Islands	—	—	1	—	—	—	—	—	—	1
China	36	13	6	4	1	—	1	9	39	83
Ontario	26	37	2	2	—	2	7	4	14	83
South Africa	1	5	—	—	—	—	42	—	23	49
Japan	7	2	1	—	3	—	—	8	8	25
India	1	9	—	—	—	—	—	4	5	15
Argentina	1	8	—	—	—	—	—	1	4	10
Bolivia	3	4	—	—	—	—	—	1	2	8
Mexico	—	6	—	—	—	—	—	—	5	7
Chile	—	6	—	—	—	—	—	—	2	6
Turkey	1	2	1	—	—	—	—	—	3	6
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Russia	2	—	1	—	—	—	—	—	1	4
Saskatchewan	1	1	1	—	—	—	—	—	1	4
Alberta	2	—	—	—	—	—	—	—	2	3
Colombia	—	2	—	—	—	—	—	—	1	3
Siam	—	3	—	—	—	—	—	—	2	3
Manchuria	—	1	—	—	—	—	—	1	1	2
Nova Scotia	—	—	1	—	—	—	1	—	—	2
Peru	1	1	—	—	—	—	—	—	2	2
Spain	—	1	—	—	—	—	—	—	2	2
Australia	—	—	—	—	—	—	1	—	—	1
Austria	—	—	—	—	—	—	—	1	—	1
British West Indies	1	—	—	—	—	—	—	—	1	1
Burma	—	—	—	—	—	—	—	—	1	1
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Portugal	—	—	—	—	—	—	—	—	1	1
Quebec	—	1	—	—	—	—	—	—	—	1

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